

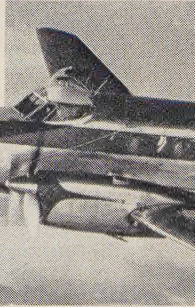
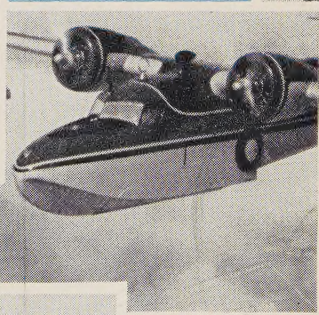
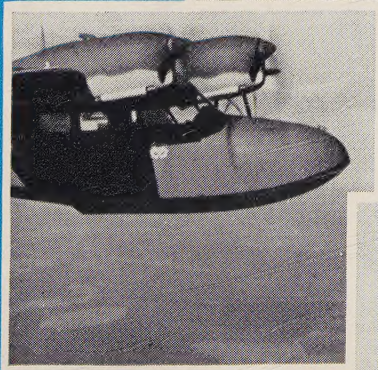
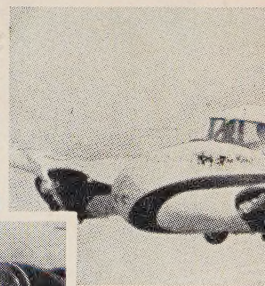
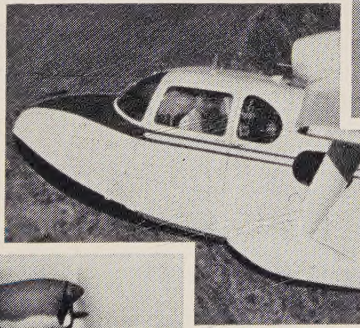
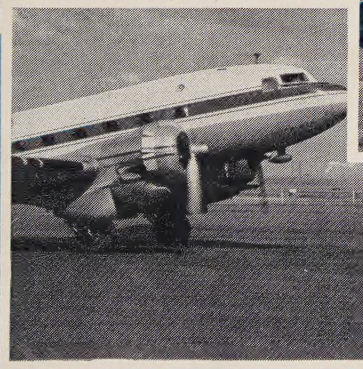
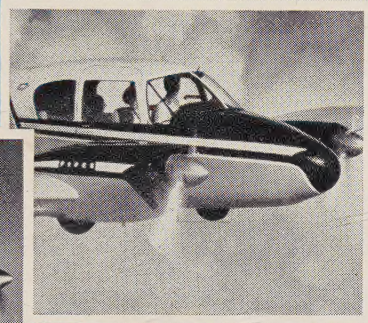
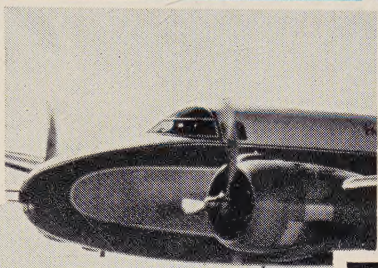
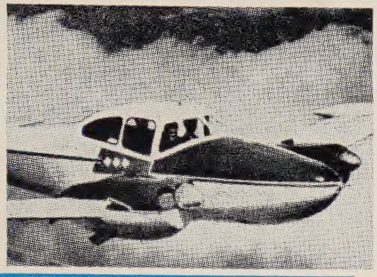
# Skyways

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FOR BUSINESS

LIGHT TWINS VS. HEAVY TWINS

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JANUARY 1958

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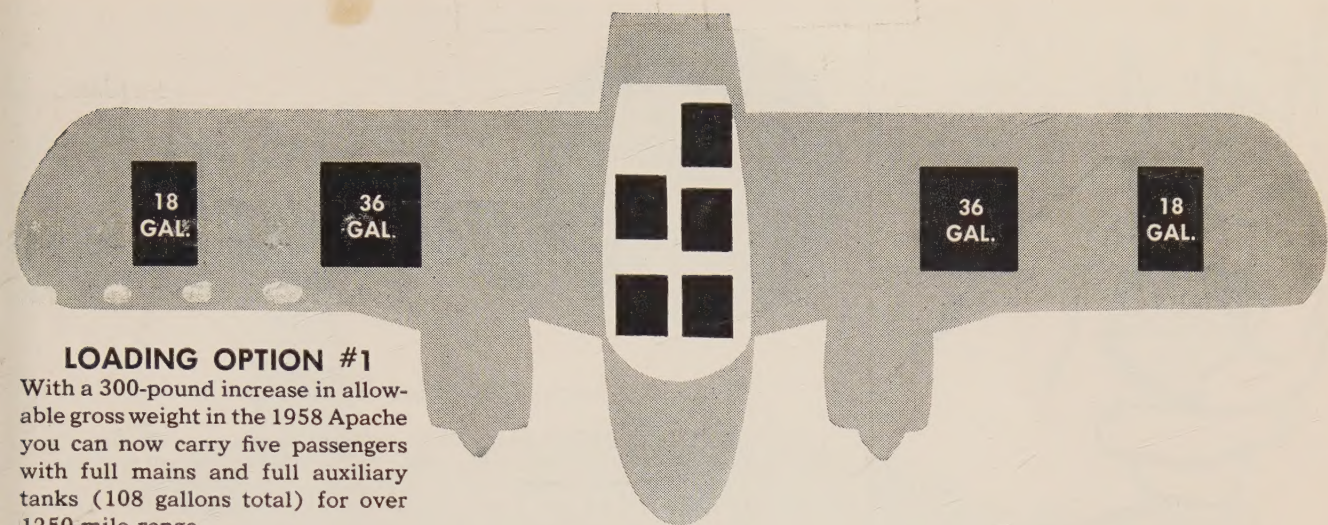
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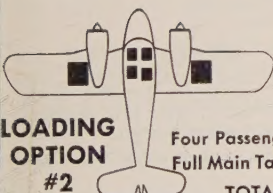
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# Skyways

FOR BUSINESS

JANUARY, 1958

The official publication of the National Business Aircraft Association

**COVER:** Light and heavy business twins. From top left they are Camair, Learstar, Convair 440, Twin-Bonanza, Apache, Super Ventura, DC-3, Beech Super 18, Cessna 310, Beech Travel Air, Grumman Widgeon, Trecker Gull, Grumman Mallard, Riley Twin Navion, Aero Commander, DeHavilland Dove.

### Editorial

Survival of the Fittest .....	4
Air Your Views .....	6
NBAA Director's Notes; Suite 344 .....	7
Aviation Roundup .....	8
Light Twins vs. Heavy Twins .....	10
Pilot's Report: Mooney Mark 20 .....	Chuck Banfe 13
Aircraft Production and Marketing Outlook .....	Joseph T. Geuting Jr. 21
The Pagan .....	32

RADAN, Doppler Navigation Aid ...	Gordon Edwards 36
10 Years of Service .....	38

### NAVICOM

#### New Low Frequency NAV Systems Threaten

VHF/UHF Supremacy .....	14
"Synthetic VFR" .....	15
Bendix-Decca ATC Procedure .....	40

General News .....	15	Greenhouse	
Safety Exchange ...	18	Patter "Torch" Lewis	32
Safety Digest .....	22	Accident Report ....	34
Maintenance .....	27	In Business Hangar .	42
OX5 .....	33	Nu-Avi-Quip .....	47

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EDITOR & PUBLISHER

LOIS HENRY

EDITORIAL

Lindy Boyes

Joseph Bush

George Watts

R. J. Childerhose, Canada

CONTRIBUTING EDITORS

Capt. Chuck Banfe, West Coast

Karl Hess, Fuels & Oils—Dick Groux, Wash., DC

Herbert O. Fisher, Flight Evaluations

SALES & PUBLIC RELATIONS

I. R. Ackerman

BUSINESS & PRODUCTION

MANAGER  
Stanley M. Cook

READER SERVICE

CIRCULATION  
Philip E. Woldenberg

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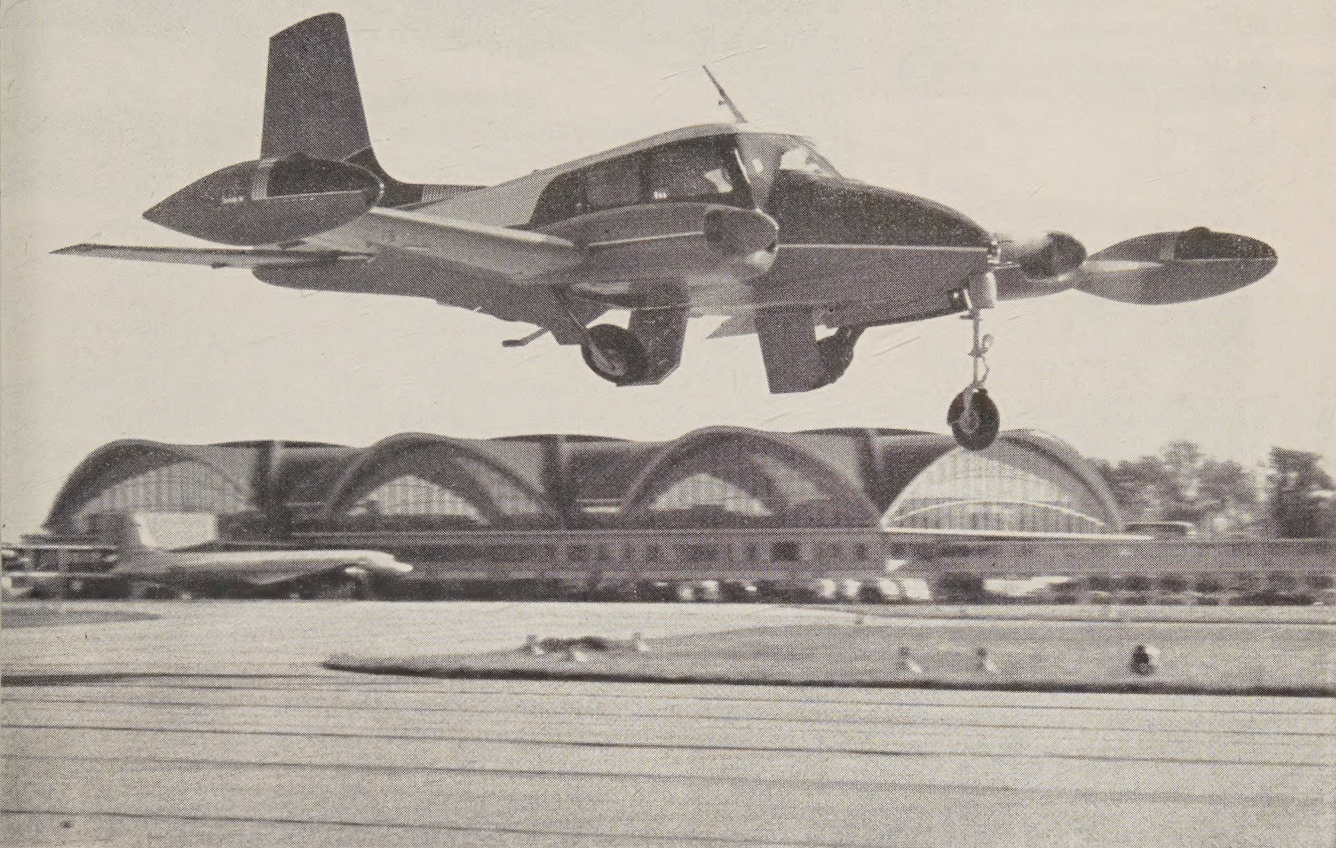
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# MEET THE WBAALT\*! NEW CESSNA 310B

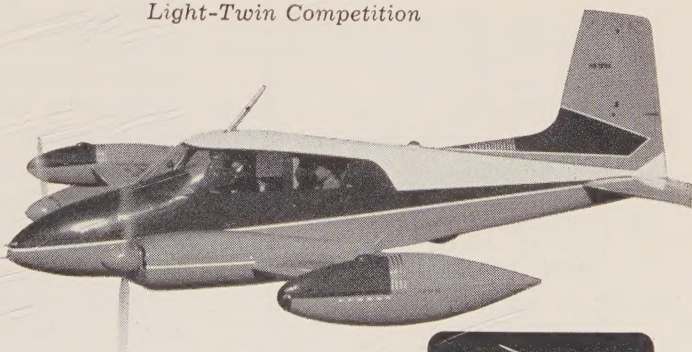


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In the arts of war and defense, the tempo of advancement has accelerated with unbelievable speed.

The machine gun, the flame thrower and the bazooka of World War II and the Korean "police action" are becoming obsolete.

True, the machine gun, the flame thrower, the bazooka and its latest line of short range cousins—ground to ground rockets—may have a place in solidifying future conflicts, but they cannot be expected to cause an enemy to throw in the sponge. Nor to deter war!

Long range missiles capable of carrying atomic or nuclear warheads are the new tools that both deter and win wars.

Traveling at ten to twenty times the speed of sound, the missile has the element of surprise. Its warhead packs heat and shock waves capable of vast destruction; capable of knocking out an enemy's means of production. It can carry deadly radiation, in the presence of which life and the will to live dies.

Are these present day facts of life fully appreciated by the average citizen? Do all of us fully understand that we live at a time when Communism has announced its intention and has taken step after step to subjugate the world? Do any of us really think that the march of Communism can be halted without possessing the absolute deterrent? If we do understand the full import of this situation, will we not be individually and collectively guilty of criminal negligence if we remain indifferent, passive and apathetic? God forbid!

This is the time for patriotism, the hour for decision and for action. We simply must possess the means to deter war; failing that, we must possess the means to win war—any war! Any other course is suicidal.

How do we get that means? Not by intra-Service rivalries. Not by political name calling. Not by tax reductions. Not by public apathy. Nor any other path of least resistance. It's belt buckling time. A time when men are separated from boys, as is always true in a test for survival. Only the fittest can expect to win. And we will not prove to be the fittest if we do not possess the best missiles.

Where do missiles come from? How do we get them? Largely from men who understand hypersonics, metallurgy, aerodynamics, aerothermodynamics and electronics. And where are these men? Mostly within aviation and its associated supply industries.

Lt. Gen. Samuel E. Anderson, Commander, Air Research and Development Command, recently said, "It is important to realize that the aircraft industry is the missile industry. The arts and sciences that have brought manned flight from the 42 mph of the Wright Flyer to the supersonic aircraft of today are the same arts and sciences which, with greater refinement and sophistication, have made guided missiles a reality."

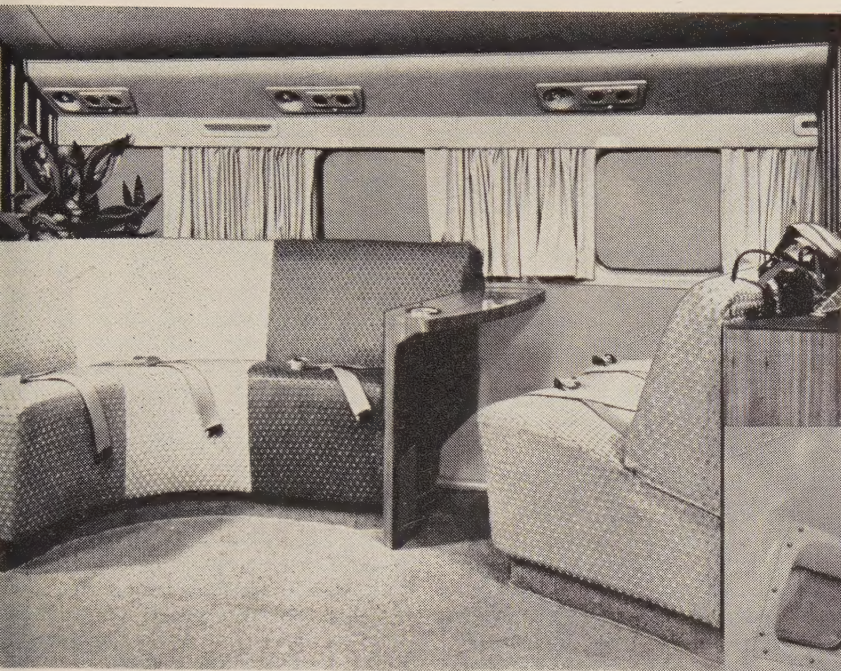
By putting the aviation industry into all out work to regain the missile lead that Russia has grabbed, we will do two things:

1. Insure supremacy in having the best deterrent to war—or, if needs be, the capacity to win war;
2. Insure future capacity to build and man the transportation vehicles of peace—the airplane.

In bygone years the people who controlled the seas controlled the world. In the years to come, those who control the air ocean will control the world. This will be true whether in war or in the commerce of peace. Both survival of our nation in war and survival and prosperity in peace hinge upon how well we the American people understand this basic premise and insist upon accomplishments which only our aviation industry can give. If enough people understand and care, they will tell their Congressmen and Senators.

# LOUNGES and GALLEYS

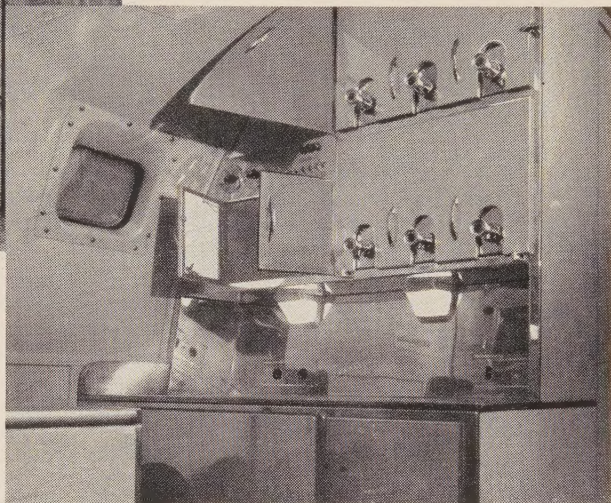
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# AIR YOUR VIEWS

To the editor:

We appreciate very much reading Skyways each month and have intended for some time to write you and compliment you on the fine job you are doing on covering business aircraft.

Yours is easily the outstanding magazine in this field (business aircraft) and we wish you every continued success.

M. Berley Kittrell, Pres.  
Dixie Aviation Co.  
West Columbia, S.C.

Dear editor,

In regard to your Military Domination editorial of October, I submit the following:

Military domination on land, sea and in the air is under fire and, as some suggest may be replaced in whole or in part, by civilian counterparts. Military reservations, some think, are no longer needed for troop training—after all we are at peace with the world, or are we? Naval bases could be turned over to the I.L.U., Machinists Union and various civilian shipbuilding units such as Moore Shipyard; after all naval vessels are just vessels at bottom! Air training and missile testing areas could be confined to Eniwetok, or Timbuctoo, or somewhere out of continental U.S. Why should those activities be dominated by the military when everybody knows

civilians could do the job better—until the fighting starts!

It is refreshing to learn that our country's freedom is based on the Legislative, Judicial and Executive branches of the government and that all these are civilian. This casual statement seems to cover the situation like a blanket and to prove again that the military play no part in the United States government (except that the President is the Military Commander in Chief), or in the safety of our country—again, except in time of war.

A great part of public thinking (or is this an exaggeration?) propounds the hypothesis that military training in time of peace is an expensive and inconvenient luxury foisted upon the American tax-payer by admirals and generals.

Few of these protestants, however, would advocate no training for their Alma Mater's football team, especially if they had a little bet up on it. Just as the game is the pay-off, so for the military, the battle is the pay-off—and a little training helps.

The big question is: Where can the military train so as to interfere with me the least and cost me the least? To move 3,000,000 military men, their arms, their ships, their planes and their wives to Eniwetok (or any remote spot), we think

would cost a lot of money—your money, my money. As an afterthought, we might consider the need for suitable training areas for our military—in the air, on the sea (and in it, too), and on the land.

Of course, if one insists on flying over White Sands or Cape Canaveral, or fishing in a naval gunnery area, or hunting on Hunter-Liggett artillery range, why perhaps that's his Constitutional right, but it doesn't sound very sensible, now does it? For another example, the Air Force has a fan-shaped Restricted Area in a small bit of Chesapeake Bay, near the North Beach. It is outside of every air route according to the A.F. chart inspectors and was presumably selected so as to interfere with no plane on course. But it is easy to understand that occasionally a civilian pilot, not up on his navigation and/or unable to read his air chart might wander into this unfamiliar area and get into trouble. It is reasonable to suppose that this same driver might ignore red lights on our streets and highways and charge down a one-way street and get into trouble.

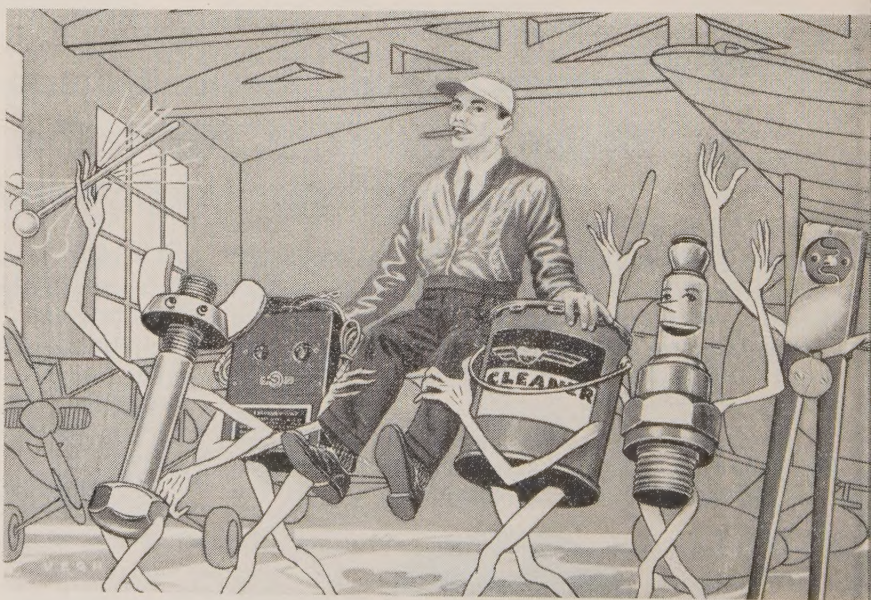
There is a very large number of cautioning, restricted danger and prohibited areas in these United States, as well as

(Continued on page 35)

## "We Always Boost the FIXED BASE OPERATOR"

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With Congress re-convening this month, civil aviation organizations expect to see a concentrated drive by Department of Defense representatives on the House and Senate Armed Services Committee members.

Objective: To defeat current CAB proposed regulation which would limit military's currently authorized "look-out—here—come" disregard for Civil Aeronautics regulations.

Public discussion on the CAB's proposal was boycotted by the military who refused to appear. Civil aviation—including airlines—unanimously endorsed and, some observers believe, bucked up CAB's efforts to eliminate the one-sided military veto power over air regulations.

At one point in the CAB's public discussion it was hard to tell who was speaking—Max Karant of AOPA or Bill Becker of Air Transport Association—that's how unanimous civil aviation's stand was on the CAB proposal.

\* \* \*

On the other hand—insurance companies, influenced by CAB's near-collision reports, are considering raising their premium rates.

What the CAB failed to accurately point out was that the exposure rate (amount of hours and miles flown by all aircraft) had also increased.

This one-sided presentation by CAB has been challenged by NBAA in an effort to get all the facts before those insurers in order for them to realistically appraise the situation.

\* \* \*

Important proposed amendments to Air Traffic Rules now being studied by business aviation are:

- 1) Establishment of standard altimeter settings at and above 24,000 feet.
- 2) Raising the existing floor of controlled airspace.
- 3) Increasing VFR minimums in High Density Zones.
- 4) Establishing a "service-test" airway in which positive control will be maintained over all traffic regardless of weather.

NBAA making exhaustive analysis of each of these proposals and their possible effects on business aircraft. If you haven't obtained a copy of the CAB proposals—especially on items 2 and 3—be sure to do so. Read them . . . analyse them . . . and let NBAA know how you feel about them.

Business aircraft owners and operators—23,000 strong—must make their voices heard.

\* \* \*

The story title "Wings are for Chickens" recently appearing in a man-type magazine—caused Jacques Andre Istel, parachute jumper, about whom the story was written to dump his chute and land squarely on the he-man editor's arched back. Apologies for the mis-quoted title were in the mail before the mag hit the newsstands. Seems that Jacques . . . a very fine guy . . . is also an ardent airplane pilot and would like to keep his many friends who fly airplanes.

\* \* \*

DIDJA KNOW . . . that there are ten Ford tri-motors still actively registered with the CAA . . . that two manufacturers account for 45 percent of the active planes flying. Piper with 5,731 has 24 percent of the total and Cessna with 13,734 has 21 percent of the total . . . that there are 64,688 active aircraft of which only 1,735 are flown by scheduled and non-scheduled carriers . . . that there are 58,404 single-engine . . . 1,015 twin-engine . . . 13 tri-motors . . . and 867 four-engine aircraft actively registered. All this according to the recently published CAA statistical study of aircraft.

High-speed turn offs—the angles and speeds at which aircraft can safely turn off of active runways after landing—are now under full-scale testing at McClellan AFB near Sacramento, Calif.

One of the first projects of the newly-created and activated Airways Modernization Board—the tests will include many types of aircraft from four-engine jets to light twins.

Program was expedited when civil airport operators pointed out that \$20,000,000 has been allocated for new runway construction and no firm policy governing high-speed turn offs had yet been offered by CAA.

. . . . AND A HAPPY NEW YEAR TO YOU, too . . . . with Bill Lawton and family just returning from Florida, Dick Groux and family returning from Iowa and Kathy returning from Missouri, after much needed vacations, we, at Suite 344 are ready to start a new year, facing all crises, arguing if necessary, yes, fighting if necessary, speaking not only on behalf of the membership but of all business aircraft operators, in our own dignified, but firm way.

Your Board of Directors held the November Board Meeting in Washington, D. C. Those present, your President, Joseph B. Burns, representing The Fuller Brush Co.; your Treasurer, Gerard J. Eger, representing International Harvester Co.; B. J. Bergesen, representing Ford Motor Co.; Ralph E. Piper, representing Monsanto Chemical Co. and John Winant, representing Sprague Electric Co. Because of General Electric reorganizing and transferring its flight operations, the Board regrettably accepted Curt G. Talbot's resignation as Board Member, but thanks to GE's interest in NBAA and what it stands for, E. M. Beattie, GE's Manager of Executive Aircraft Operations, was nominated as Director to fill the unexpired term of Mr. Talbot.

\* \* \*

NBAA is now a member of the National Safety Council as an Association Member. The purposes of the NSC are to provide accident prevention information and assistance to association executives so they may better serve their members in the area of safety, and to enable associations to distribute NSC safety publications to their members. The NSC officially endorsed NBAA's Annual Safety Awards and granted us the authority to affix the Green Cross Seal to all member and member pilot certificates in 1955.

"Torch" Lewis, Thatcher Glass Mfg. Co., responsible for three of seven new members announced in November Skyways, says it was no effort at all to gain the new members after explaining NBAA's value as a group of business aircraft owners operators, the importance of organization. Keep up the good work!

\* \* \*

Bob Hamilton, chief pilot, National Steel Corp.; Jerry Goldman, chief pilot, Purdue University; Jim Magnus, Minneapolis-Honeywell Regulator Co.; Harley Kysor, Aeronautical Consultants & Associates, Inc. were welcome visitors recently. Suite 344 welcomes you at any time.

Talk about a busy Executive Director, Bill Lawton participated in the Sixth Massachusetts Aviation Conference on "Accommodations for Business and Pleasure Travelers" at Worcester, Mass.; Annual Meeting of National Association of State Aviation Officials in "Sun Valley", Idaho; Annual Meeting of National Aviation Trades Association in Dallas, Tex.; 10th Annual Indiana Aviation Conference in Turkey Run, Ind.; since NBAA's annual meeting. Dick Groux, assistant, has also been on the run, attending Airspace Panel Meetings, Tall Tower Meetings, a meeting in Baltimore with Airport Consultants re general aviation's requirements at a Second Washington Airport.

\* \* \*

A big welcome to new members of NBAA; JAMES S. HARRISON, Wichita Falls, Tex. (Regular Member), oil production, operating Beech E-18s. William R. Brand, chief pilot, is NBAA Representative. LINDEN FLIGHT SERVICE, INC., Linden, N. J. (Associate Member), aviation management, operating Beechcraft E18s, 3 Beechcraft D18s and Beechcraft H35. Robert B. Meyer, president, is NBAA Rep. and Alfred F. B. Kuhl is chief pilot; MEMPHIS AERO CORP., Memphis, Tenn. (Associate Member), aircraft sales and service, James Hammond III, president, is NBAA Rep.; SOUTHERN FLIGHT SERVICE INC., Charlotte, N. C., maintenance and overhaul, D. W. Regester, maintenance supt., is NBAA Rep. For your convenience, see November, 1957, issue of SKYWAYS for NBAA membership application.

*C.M.*

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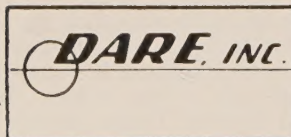
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## Aviation Roundup

*NEW CESSNA MODEL 175* to be on market in March. Plane features 175 hp engine Model to "fill gap" between present 172 and 180 series. Price \$11,000.

★ ★ ★

*1958 MOONEY, PIPER, BEECH* aircraft models announced by firm extolling improvements. Mooney's Mark 20 (see Pilot's Report this issue) anticipates good market this year. Company has a twin model in the works, also. Piper's Tri-Pacer offers 160 hp for better speed. Beech offers improved versions of the Super 18, Twin-Bonanza (supercharged), Travel Air and J35 Bonanza.

★ ★ ★

*FAIRCHILD ENGINE DIV.*, Fairchild Engine and Airplane Corp., Deer Park, N. Y., held a press open house including plant tour and illustrated talk by Louis W. Davis, assistant to vice president. Says Davis, great promise of gas turbine power for aircraft never to be fully realized while design and development efforts only toward high thrust, heavy power packages.

A J44 turbojet on a TWA C-82 adds power for takeoff, climb, in-flight performance when needed. The lightweight, 1,000-pound thrust engine, is first commercial application of jet assist made by a major U.S. airline. Engine is installed atop fuselage. Plane, based at Orly Field, Paris, is used as a mobile maintenance base. Future application to heavy executive craft seen.

★ ★ ★

*GRUMMAN'S NEW AGRICULTURAL AIRCRAFT*, not yet on the market, but has application in for type certificate. Reported to have 220 hp Continental engine with mount designed to handle other engines. Said to gross at 3,400 pounds. Grumman not yet releasing detailed information on the plane.

★ ★ ★

*RADAR SCREEN RECORDS EXPERIMENT* by use of special cameras put into operation by CAA to evaluate Air Traffic Control Radar Beacon System. Cameras, manufactured by Gordon Enterprises, at CAA radar sites in New York, Chicago, Washington and Norfolk, reports D. M. Stuart, director, CAA Technical Development Center, Indianapolis, Ind. Move may presage use of cameras to record most of aircraft landings and takeoffs. Study of beacon system undertaken jointly by Air Navigation Development Board and CAA.

★ ★ ★

*INTERCHANGEABLE ENGINES UNDER DEVELOPMENT* by German engineers. Multi-unit gasoline engines are interchangeable on various types of land vehicles and aircraft by adding or dropping cylinders, says Heinrich Christiansen, pres., Ilo-Werke GmbH, Rockwell Manufacturing Co. subsidiary, of Pinneberg and Munich, Germany. The air-cooled engines have four to six to eight cylinders and a maximum of 500 hp. Engines to have commercial and military applications.

★ ★ ★

*LEAR SELLS GENEVA SALES AND SERVICE* activities to new Swiss firm, Electraviva S.A., Richard M. Mock, Lear, Inc., president, announces. New firm acquired service operations in Geneva and right to sell Lear products in Switzerland. Some Lear S.A. personnel transferred to new firm. Financial details not told.

★ ★ ★

*MANNED AIRCRAFT UNLIMITED IN SPEED, ALTITUDE* potentialities, practically, says Dr. Edmund A. Bartsch, German scientist in Lockheed Aircraft Corp.'s flight dynamics department. "Developing new structural techniques and materials as required, no reason why aircraft designers cannot reach speed well beyond supersonic regime." "Far from closing an era of manned aircraft, such planes as the F-104 Starfighter pave the way to new investigation of structures and materials which will result in fantastically faster speeds."

# Aviation Roundup

**BEECH BUSINESS PLANE SALES FOR 1958** indicate record-breaking year with firm orders for more than \$14,800,000, says Mrs. O. A. Beech, Beechcraft president. 1957 was best commercial year of Beech's 25-year history.

★ ★ ★  
**NATIONAL ASSOCIATION OF STATE OFFICIALS** approved Oregon's Director of Aeronautics' resolution requesting Bureau of Internal Revenue to make provisions for deducting refundable one-cent-per-gallon federal motor tax at wholesale level. Such plan eliminates necessity of making annual application for gas tax refund; will aid itinerant aircraft.

★ ★ ★  
**OTHER-THAN-FLIGHT-PURPOSES** by non-tenants at Tucson Municipal Airport will be charged "entrance fee" for engaging in modifying, overhauling, repairing or scrapping aircraft, major aircraft components or engines. Policy result of extra burdens, costs imposed on Tucson Airport Authority.

★ ★ ★  
**INTERNATIONAL NORTHWEST AVIATION COUNCIL's** 21st annual convention at Calgary, Canada, emphasized need for recognition of general aviation's growing stature and need for service between Calgary and Spokane, Wash. A border strip in the Oroville-Osoyoos area was urged by Washington Commission attending.

★ ★ ★  
**LARGEST "WORLD'S FAIR OF FLYING"** ever to assemble is first International Air Show and Exposition, Master Field, Miami, Fla., January 22 through 26. Five-day exhibit features displays by aircraft manufacturers and transport companies. Sponsored by Sertoma Club of Miami, show covers from balloons to space satellites and outer space missiles.

★ ★ ★  
**LATEST LITERATURE . . .** "Wings For Life," by Ruth Nichols, pioneer woman flier and great humanitarian, tells her life story in illustrated book published by J. B. Lippincott . . . "A History of the United States Air Force, 1907-1957," edited by Alfred Goldberg, more than 500 photos; publisher, Van Nostrand.

★ ★ ★  
**WHO'S NEW:** Ralph W. Kummer appointed general manager, Bay Aviation Services Co., San Francisco International Airport, Calif. . . . William A. Sipprell, elected president and director, The Babb Co., Inc., Phoenix, Ariz. . . . Thomas W. Singell appointed product manager, Dresser-Ideco Co., Columbus, O. . . . T. C. Wisenbaker, named assistant division manager, Raytheon Manufacturing Co., and H. T. Ashworth, to manager of Raytheon's Bristol, Tenn., plant . . . H. Norman Eirman, appointed division manager, northern California office, Product Research Engineering Manufacturing and Marketing Corp., Alameda.

★ ★ ★  
**DATELINES . . .** Jan. 13-17, Society of Automotive Engineers, Inc., Annual Meeting, Hotel Statler, Detroit, Mich. . . . Jan. 13-May 14, Space Technology lecture series presented by University of California Extension and Ramo-Wooldridge Corp., both of Los Angeles . . . Jan. 20-Feb. 7, Aviation Institute for Commercial Carriers and Business Pilots, presented by Aviation Safety Div., University of Southern California, Los Angeles . . . Jan. 23-25, Agricultural Aircraft Assn. Convention, Bakersfield, Calif. . . . Jan. 27-30, Plant Maintenance and Engineering Show and Conference, International Amphitheatre, Chicago, Ill. . . . Feb. 3-4, Flight Control-Panel Integration Symposium sponsored by USAF Flight Control Laboratory, Wright Air Development Center, assisted by Cook Research Laboratories, Biltmore Hotel, Dayton, O. . . . Feb. 4-6, Conference of Reinforced Plastics, Div. of Society of Plastics Industry, Inc., Edgewater Beach Hotel, Chicago.



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# Light Twins vs. Heavy Twins

**A**mong operators of business aircraft Skyways finds two distinct schools of thought as to the proper use of light twins.

Skyways has interviewed light twin owners representing both schools. This survey has been made in an attempt to establish the basic reasons causing one operator to adopt a light twin policy diametrically opposite to the policy of another operator.

It was found that some operators maintain that light twins can accomplish the whole job in business transportation, while others believe just as strongly that light twins have limited capabilities.

Skyways' findings are both informative and interesting. It is believed that summarizing and reporting the different viewpoints will be in the public interest. In order to report at all it was necessary to promise most informants that anonymity would be preserved. That seems all right inasmuch as the value of expressed opinions does not seem to rest upon *who* said what nearly so much as it does upon *why* he believes it.

On one point there was at least unanimous agreement: Light twins are wonderful!

Nothing but the highest praise was found for the various light twin manufacturers who conceived and engineered them, who privately financed them and built them. Everyone readily admits that they are valuable business tools.

The question seems to be: What kind of a business tool? Tack, claw or sledge hammer?

We tried to determine if economics might guide opinions. One of the first questions we asked was designed to determine if price (capital outlay) was a controlling factor influencing the choice of light twins. Most operators, and particularly those who use light twins exclusively, were quick to point out that *used* twins of heavier category could be bought as cheaply as, if not cheaper, than light twins.

The majority of operators using both light and heavy twins, which we are calling the multi-category group, pointed out that while economics, initial capital outlay in particular, was a factor in the

purchase of any airplane, it was not a decisive factor in choosing between a light and a heavy twin.

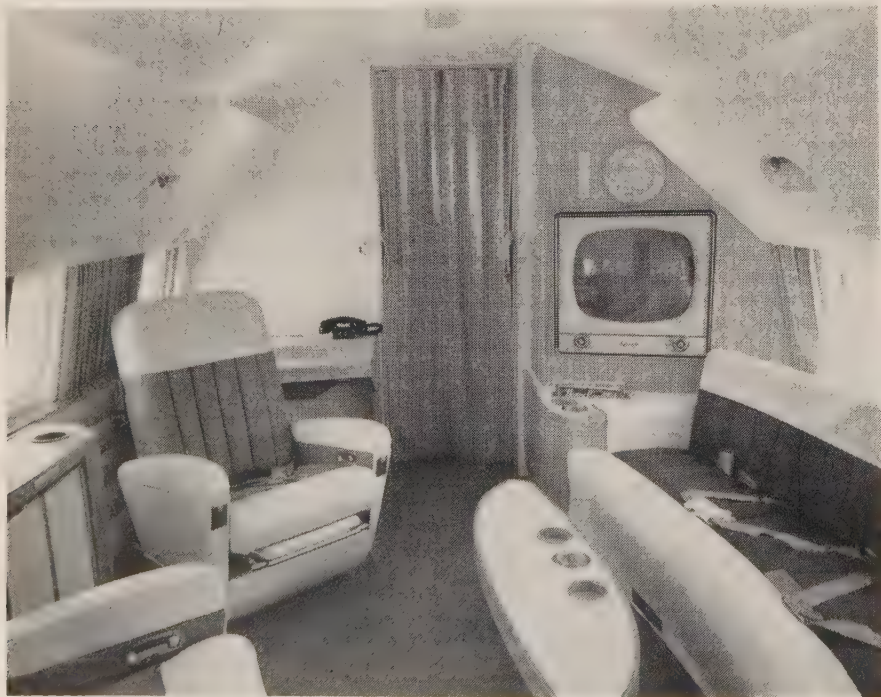
From the multi-category operator we heard more than once that *any* airplane should be chosen to fit an existing need. We were told that the first consideration in the purchase of an aircraft was to determine the job the airplane would be called upon to do, the distances it would be expected to cover, the most economical speed for such distances, the average payload expected to be carried, whether or not it would be necessary to fly weather, as well as other things including the class of employees it would be expected to serve, i.e., top echelon, middle management, etc.

Both schools of thought therefore refused to admit that original investment costs (capital outlay) comprise the principal factor influencing the choice of a light twin.

On the question of operational costs we ran into "hedging" answers. Those operators using light twins exclusively insist that it is not good business to increase operational costs by using heavier twins when light ones are comparable, both time-wise and range-wise, and at lesser operational costs.

It is in the area of operational costs that we found volatile disagreement between exclusive light twin operators and the multi-category group. Multi-category operators contend that the utilization and service to be expected from light twins are not comparable *under many conditions* with heavier twins. They say these conditions are beyond and above time and range. To them it is these conditions that dictate the necessity for heavier twins.

Again and again we heard the theme that *every* category of airplane, light twin, heavy twin, even four engine or single engine, has a conceivable place in some type of business operation. The questions these people pose are, "To what use do you propose to put a particular airplane" i.e., "What will be your operational problems with respect to runway requirements, with respect to payload needs; how far do you need to go non-stop; what is the most economic block speed; what class of employee will use the airplane, top or middle management; will weather be flown, etc., etc.?"



CONVAIR'S EXECUTIVE 440 illustrates heavy twin interior decoration possibility.

In order to get down to cases and smoke the rabbit out of the hole, we tried to set up an example:

"Suppose," we said, "most of your trips will be 100 to 400 miles. In such a case why use a heavier twin? Will not a light twin do the job of getting you there quickly enough and with sufficient comfort?"

"Yes," came the answer, "provided you don't want to make 100 to 400 mile trips *under all conditions*."

"It is assumed," we said, "that it is in this 'all conditions' category that your decision hinges."

"Mostly, yes, but there are other reasons, too."

"Let's take those mostly reasons first. To what do you have reference, specifically when you say that light twins should not be flown under all conditions? Do you mean they should not be flown in weather?"

"We certainly believe it is unsafe to fly light twins on instruments and under all-weather conditions."

"What about through and over clouds?"

"Could be okay *if* the terminal and alternates are known to have 1,000, maybe 1,500 foot ceilings with three miles or better of visibility."

"What about night flights?"

"Night flights in light twins are okay in VFR weather." We now thought we were getting down to cases. The next multi-category operator we talked with was enthusiastic about light twins. His company operated five in addition to heavier equipment.

"Someone has suggested," we said to this next multi-category consultant, "that light twins should *not* be flown in weather. Do you agree?"

"I sure do."

"Do you have valid reasons? We know some owners who feel that light twins can be flown as safely under instrument conditions as under VFR conditions. Some operators are doing it day after day and with excellent safety records."

"Sure, you might temporarily produce a good safety record in any work involving *irreducible hazards*. Sooner or later though—wham! And you have had it."

We made a mental note of the words "irreducible hazards."

"What would cause you to 'have it'? we asked.

"Any one of several things." Here we recalled the remark of another multi-category operator who said that there were other reasons too. We probed a little deeper.

"Can we tie down those 'several things'?"

"I would not want to be quoted," we had heard that one before, "but there are several hazards connected with IFR light twin operations which can't be guarded against."

"But they can be guarded against in heavier twins?"

"Sure. They can be and they are in our operations."

"Let's take a 'for instance'."

"Well, icing conditions is one of them. These light twins can't pack a

load of ice and they can't shed it. They have no business sticking their noses in it."

"But not all IFR conditions are icing conditions."

"True. But I have been in icing many times when it wasn't forecast, and when we were not expecting it."

"Then light twins should not fly any weather where icing conditions may be encountered?"

"Light twins should not fly weather. Period."

"Do you have other reasons for limiting light twins to VFR besides possible

cockpit. Weather conditions produce too many complications for one man to handle. Especially in high density areas."

"Thank you for being specific. Maybe you have even other reasons."

"Yes, I have. It is my opinion that no airplane should be flown on instruments where there is not *absolute separation* between the crew and the passengers. The unknown emotional stability of passengers riding beside you or behind you in a light twin could, to say the least, prove too distracting to permit the degree of concentration a



BEECHCRAFT SUPER 18 models attractive interior design for a light executive twin.

icing?"

"Plenty of them."

"Would you mind citing one or two?"

"Listen, I have a lot of good reasons and am not exactly alone in believing them. Only trouble about discussing them is that I don't want some one to get the idea that I am against light twins. I am not. I think they are wonderful. They make one of the best transportation work horses a company can have a provided you use them right."

"Off the record, so far as quoting you or mentioning your company is concerned, would you mind telling us some of the 'lot of good reasons' you have?"

"Okay, you've asked for it. How many light twins are there flying today that have enough allowable load capacity to duplicate radios, instruments and electronics, as well as to duplicate sources of power and have ample generation to run their gadgets? No airplane should be flown all-weather on instruments without duplicate radio, duplicate instrumentation, duplicate sources of power and plenty of juice. Further, no airplane should be flown all-weather without two men in the

pilot must have on a low approach."

"Then you think the automobile type of seating in a light twin, and especially where there is not a bulkhead between the passengers and the crew, produces what you term an irreducible hazard?"

"I sure do."

"You certainly made yourself very clear with reference to safety. Do you have other reasons?"

He did have other reasons. He said the experience of his company showed that it was seldom that top management would ride in the light twins. He thought perhaps the reasons were that light twins were seldom used beyond a 500 mile range and were used mostly to go to isolated field operations where top management seldom went. He pointed out that in his company (which was a large corporation) the trips made by the big bosses were usually of longer range than 300 or 400 miles. While there had been no expressed statements, it seemed obvious to this consultant that the heads of his company expected more comfort on their longer trips than could be had in the smaller twins. They seemed to prefer room to get up and

(Continued on page 48)



*At Last*

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hose; Clerk John Newton, trumpeting open His Majesty's swank lounge and flight ops room; Exec VP Winston Castleberry, proffering the key to hospitality and service; Stenog Peggy Martin, harem-girling up the stairs with the model of a sleek SAC-based rent car, and Famed Foodist Carlo Messina, bearing exotic tidbits from the glamorous Flight Deck Restaurant.

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# MOONEY *Mite's* BIG BROTHER, MARK 20

by Chuck Banfe

**A**l Mooney doesn't dream up anything but a high-performing, slick-looking aircraft.

Starting with his Culver Cadet back in 1930, the unquiet birdmen began to beat a staccato for the design genius who created this high-performing, slick-looking airplane.

Not long after, his blueprints bore the Mooney Mite which still is a surprising aircraft, skimpy on petrol and fat with airspeed for horsepower.

Latest in the Mooney menagerie is the Mooney Mark 20 which doesn't take a back seat to any of his former or later designs . . . which include at least some pencil markings on the Lockheed 329 Jetstar because Mooney is with Lockheed at Marietta, Ga., wielding 4H pencils while on leave from Mooney Aircraft Co.

It is claimed that the Mark 20 can make mincemeat of any other single-engine, four-place aircraft on the market with more speed and performance and the ability to carry a greater payload per horsepower than anyone else can offer and, from what I've seen, you'd better believe it!

Norm Hoffman, aggressive Vice President in charge of sales, flew a production model Mark 20 to the NBAA convention in Denver to break it in before it was flown to the new owner south of the border and to give the brethren at the convention a gander at the classy performer.

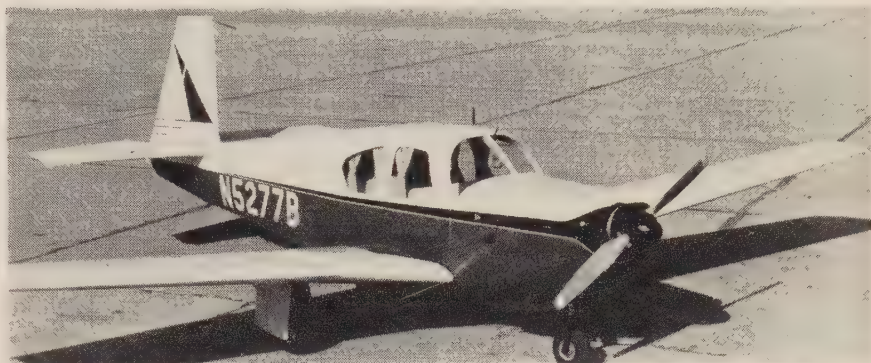
We went out in the early morning. The air was clear and cool at mile-high Stapleton Field.

As Norm gave the Mark 20 a thorough outside check I couldn't help noticing how the sleek, cream-colored plane resembled the trim lines of the Mooney Mite.

"Look at this nosewheel for strength," Norm said and grabbed onto the prop and swung on it, bouncing his feet hard against the nosewheel. It dipped slightly as if nodding assent.

"The cabin area is of tubular steel construction," said Dick Martin, Mooney Sales Manager, "with a baggage area of monocoque for strength."

"The wings are of sitka spruce with hollow laminated spruce spars," he added. "The wing covering is poplar plywood. There have been some rumbles about wood wings but our wing is dipped in a special preservative and soaks up seven gallons in the interior. It will stand up against any metal wing you can name. Remember, the Mosquito bomber did all right with this type of construction. And, because it uses laminar flow (the first civilian air-



craft to do so), the Mark 20 has one of the lowest drag coefficients of any 4-place executive plane in the air."

For good drying, there are small air vents underneath each wing surface so no air is ever trapped inside.

There are no trim tabs on the Mooney Mark 20. Each control moves the entire surface. It gives the Mooney a big-plane feel when changing trim and makes for a more stable-flying aircraft.

Mooney's interior designers and upholsterers should be given kudos for the job they did. The seats are sliding-adjustable for long-flight comfort and have welcome stretch room. The interior utilizes foam cushioning and is upholstered in durable nylon piped with vinyl.

A large hunk of the credit for the outstanding soundproofing in the four-place cabin comes from a newly-designed watertight door as well as a new exhaust system which eliminates the troublesome old augmentors.

The instrument panel tilts forward making it easy on the eyeballs. The panel is not over-gross with instruments and there is plenty of garden space for more.

The radio gear is all within reach containing all of the needed facilities.

The control column is square in a modern vein and the right controls can be disengaged.

The engine started without a cough; Norm cranked up the tower for taxi clearance and we left the blocks.

The vernier throttle is a cute gimmick for smooth taxiing. The knob is just rotated for correct power settings. The steerable nosewheel on the Mark 20 and toe-operated brakes permitted smooth-as-silk maneuvering among the airliners on the ramp.

The tower came in loud and clear through the cabin speaker.

When the runup was completed, I poured the coal and the Mark 20 built up a head of steam. In less than 20

seconds we were on our way upstairs.

Norm brought up the gear, which is manipulated much like the DC-3. It requires a positive action and locks under the instrument panel with a warning system if the pilot has pulled a boo-boo. Like the flap system, the gear is manually operated.

The controls have a nice, even feel to them! laminar flow design can take a bow for that.

At low speeds, with an up-me-bucko from the laminar flow, the Mark 20 affects a stable flying configuration. Then at high speeds, the Mark 20 climbs on the step, much like a sea-plane, and the controls maintain a similar, big-plane feel.

With the aircraft in the cruise structure of 2450 rpm and 23.5" hg, which is 75% power; we scooted along at a true airspeed of 167 mph!

Such a cruising speed at 7,000 feet for a 150 hp engine makes the "one mph for every hp" as old as the Pinta, Nina and Santa Maria.

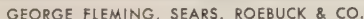
Consider that the Mark 20 has a 107 mph differential between maximum cruise and stall and you will have a bird's eye view of how stable and clean it is.

We put the Mark 20 through a full test flight with steep turns, dives, climbs, and all configurations of stalls.

It performed like a center ring star but was most impressive in stalls.

The Mark 20 is almost impossible to stall, like an Ercoupe. The nose comes up until the airspeed is dissipated. When the lift is gone, the nose flops over but, as soon as it pitches downward, the stall is gone and full control recovered. This means that a beginner can't get into serious trouble unless he really goofs. Then, if he has his brains locked in place, all he has to do is release the controls for the Mark 20 flies best with hands off.

(Continued on page 48)



ST 7-9472

chines into some Air Route Traffic Control Centers to prepare the many enroute fix posting strips required for each flight, IFR-plan pilots can expect considerable departure delay unless they arrange to file their flight plan at least 30 minutes beforehand.

With the unprecedented and still continuing increase in IFR-plan traffic it requires approximately this amount of time to process these flight plans before the appropriate sector controller can properly coordinate and clear the departure. On turnaround flight, it is suggested that pilots who can do so should pre-file their departure plans by radio prior to landing. Airlines have been operating under the above system for some months which may explain to business pilots why an airline flight may frequently get cleared faster.

## Continental Control Area Floor To Be Lowered By Spring

The control of all airspace above 15,000 feet over virtually the entire U.S. is scheduled for sometime this spring, according to James T. Pyle, CAA Administrator. The original "floor" was established at 24,000 feet in December.

It was emphasized that controlled flight in the above area will remain optional with the pilot in clear weather. Currently airways traffic control is available only along airways and in other designated control airspace between 15,000 and 24,000 feet. By 1962 CAA hopes "to have equipment and personnel capability for control of all aircraft at high altitudes."

Although ATC will seek to encourage the use of designated high-altitude routes, it will, on request, provide separation on direct routes between any two navigation facilities up to 300 miles apart.

## ICAO Position on Nav aids

When ICAO member states embark on an expensive equipment program it has been the custom to agree on the length of time during which no new types of equipment will be required to replace the old, so that governments may plan a realistic write-off period. In the case of the VHF Omni-directional Radio Range, the standard short distance aid for certain applications, the so-called protection date had been fixed previously at 1 January 1960. The Communications Division decided to recommend an extension of the date to 1 January 1966. A factor contributing to this decision is that the requirement for the VOR system would continue for a considerable period, even if another aid were to be adopted in the near future and it was necessary to give reasonable assurance of useful life if installations were to be proceeded with.

Considerable discussion took place on the subject of short distance navigational aids. It was decided to recommend that a special ICAO meeting combining the fields of communications,

operations and air traffic control should be held at the earliest practicable date to study and reach definite conclusions on the subject. Meanwhile it was agreed that no changes to the current standards would be proposed.

Seven different long distance radio navigation aids were discussed at the meeting—four American, two British and one French. Of these systems, an American self-contained aid using the doppler principle to determine ground speed and drift, and a computer to derive navigation information is available for airline evaluation at this time; the British Dectra system, a further development of the Decca system used by shipping and aviation companies in several parts of the world, which provides tracking and ranging by using phase comparison methods, will have been evaluated by mid-1958. Agreeing that more knowledge is necessary before a choice can be made between these different systems, the Division expressed concern that a standard long distance aid has not been adopted yet, possibly because a decision in favor of any one aid had constantly been deferred by the consideration of the promise of better aids. . . . Excerpts from November, 1957, Montreal Meeting.

## New Dates On VORTAC System

In November the Civil Aeronautics Administration placed the largest electronic order in its history for \$11,400,000 worth of VORTAC equipment from International Telephone and Telegraph Corp.

The contract called for 132 dual VORTAC ground beacons, 132 sets of test monitor and control equipment and 77 antenna assemblies, all of which is ground station equipment. First deliveries were scheduled in 27 months or mid-February 1960.

This is the first major step in the 6-year VORTAC program, which calls for more than 1,230 ground stations and expenditures of \$314,000,000 by 1965. Last reported target date for VORTAC to go into operation was July 1, 1959.

Each ground station, operating over a 200-mile radius, will be a dual installation so that if the operating VORTAC equipment goes beyond preset tolerances, it automatically shuts itself off and its companion beacon goes to work instantly.

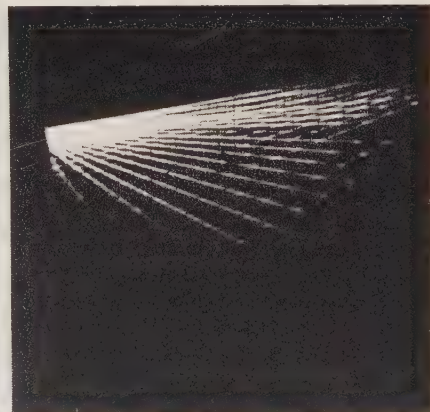
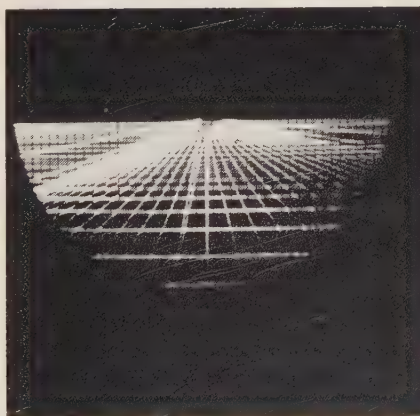
The only VORTAC ground station in operation at present is a test installation at Phillipsburg, Pa.

Identifying feature of a VORTAC



## "SYNTHETIC VFR"

**TRANSPARENT TELEVISION TUBE** installed in windshield for "Synthetic VFR" display. The 2 7/8 inch thick tube by Kaiser-Aiken of Palo Alto, California has been flown.



**"SYNTHETIC VFR" COCKPIT DISPLAY ILLUSTRATED**—Displays of ground situations for all-weather flying as produced by the Du Mont electronic contact analog generator (December SKYWAYS). High speed analog computers generate signals which produce a synthetic rectangular earth grid structure. This grid provides attitude and other reference normally obtained through the cockpit windshield under VFR conditions, eliminating the need for interpreting a half dozen instruments. By means of the grid display, the pilot can instantly know roll, pitch, yaw, altitude, ground speed and compass heading. The display on the left indicates an aircraft in level flight headed for one pole (i.e. North) while the display on the right tells him he is in a descending right turn away from north.

ground station is a plastic "teepee" structure which houses the direction-bearing equipment and is surmounted by the distance-measuring antenna.

## Cabin Speaker Systems Keep Boss Informed And Out Of Cockpit

In larger business aircraft the otherwise desirable informality between crew and executive passengers can become a hazardous distraction under certain flight conditions.

The Collins 346D-1 airborne passenger address amplifier is a completely transistorized one-quarter ATR unit having 40 watts of high fidelity output with three inputs and weighs less than ten pounds.

The 346D-1 provides inputs for the crew microphones and a tape reproducer. These inputs are arranged in priority so that the pilot may override control. Volume level is adjusted to that desired with a front panel control using a level meter on the front panel as a reference.

At full output of 40 watts (single tone input), the current required is approximately three amperes. For typical voice operation the input is approximately one ampere. No power is required on standby.

## VOR Airways For South America

The Argentine Ministry of Aeronautics has announced it signed a contract with Panagra calling for the purchase, installation and maintenance by the U.S. flag airline of seven VOR ranges from Wilcox Electric, Inc. and the training of tech personnel in the U.S.

These stations will be located at the airports along routes between Buenos Aires, Mendoza and Santiago, Chile; and Buenos Aires, Cordoba and Tucuman.

Of interest to the increasing number of business aircraft going south of the equator, the new VORs will replace the inadequate and obsolete LF facilities now there and will be the first VOR system installation by a South American government.

## New ADF Offers Digital Frequency Tuning

The Collins "Airline Standard" ADF, the DF-201, is a completely new automatic direction finder system consisting of a single conversion superheterodyne receiver housed in either a long one-half ATR or short three-quarter ATR case, precision remote tuning controls, and either flush or semi-flush mounted, sealed or non-sealed loop antennas.

The Collins 51Y receiver is a single conversion superheterodyne ADF receiver operating over the frequency range 90 kc to 1800 kc in four bands: 90-200 kc, 200-400 kc, 400-900 kc and 900-1800 kc. Bandswitching is performed automatically and remotely by the 100's knob on the control unit. Transistors are used in the servo amplifiers; crystal diodes are used in the detector and AVC gate. Only 11 vacuum tubes of four types are employed. The 51Y-1 is cased in a long one-half ATR case

and the 51Y-2 in a short three-quarter ATR. Both use identical modules. A front-mounted blower is available for the 51Y-1 for operation in extremely high ambient temperatures.

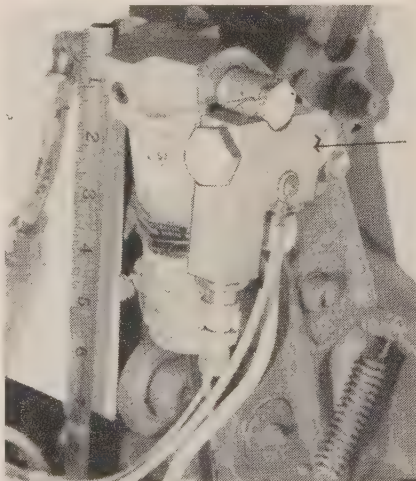


Manual direction finding operation is also provided by rotating the loop with Remote Manual Loop Control on the control box and positioning for a minimum signal.

Two Collins Mechanical Filters in the receiver are used to give the two degrees of selectivity required. Collins will furnish indicators as necessary for the ADF installation. Any indicator that meets the ARINC SYNCHRO SYSTEM MANUAL specifications may be used.

## New Device Eliminates Landing Gear Failure

Propellex Chemical Corp., Edwardsville, Ill., has designed and is manufacturing a propellant energized emergency landing gear uplock actuator. The device, weighing only 0.27 pounds, supplements present hydraulic



and pneumatic systems now being used on both commercial and military aircraft.

The unit, no larger than the palm of a hand, does not in any way impair normal operation of the landing gear system. In the event of failure of the hydraulic or pneumatic system which normally actuates the uplock mechanism, the propellant cartridge is actuated, sealing off the normal hydraulic system and supplying sufficient gas to the uplock cylinder or cylinders to unlock the gear, allowing it to free-fall into position.

## General News

### AVIA-QUIZ WINNERS

#### Of Skyways' October Issue Write-In Aviation Contest

Skyways' Avia-Quiz, divided into two parts . . . for NBAA Convention attendees and for write-in answers, announces that Lawrence Hirschinger of Muncie, Ind., and L. W. Falwell of Lynchburg, Va., are winners of the write-in portion of the contest.

Skyways thanks the participants in the contest for helping to make it a success.

First prize, awarded Lawrence Hirschinger, is a handsome table model cigarette lighter-holder, mounted in leather. Donor is the Aircsearch Aviation Service Co., division of Garrett Corp., Los Angeles, Calif.

Second prize, awarded L. W. Falwell, is a handy computer donated by Jeppesen and Co., Denver, Colo.

## Closed-Circuit Television Aids Pilots In Training Program

A closed-circuit television system which unfolds an airport panorama in front of pilots as they "land" or "take-off" in an electronic flight simulator is ordered by United Air Lines.

The TV system is part of a DC-8 jet transport flight simulator which Link Aviation, Inc., is manufacturing for delivery to UAL this spring.

According to D. R. Petty, United's vice-president, flight operations, the equipment will enable flight crews to familiarize themselves with the jet transports operations before the planes come off the production line.

Specifications for the closed-circuit TV were developed by Douglas Aircraft Co., DC-8 manufacturer. The equipment is known as the Link Visual System, Mark IV.

## New Lycoming Aircraft Engine

Lycoming announces a new high compression four cylinder aircraft engine, the O-320-B, for use in the new Piper Apache and Piper Tri-Pacer.

Compression ratio is 8.5:1. Engine delivers 160 hp, ten horsepower more than its predecessor, the O-320. Including starter and generator, weight is 278 pounds, six pounds more than earlier model.

Engine measures 23.12 inches high, 32.24 inches wide, 29.56 inches long. It is equipped with Delco Remy starter, generator and voltage regulator as standard equipment. AN or diaphragm fuel pump drive, vacuum pump drive and constant speed propeller governor drive are available as optional equipment. The engine uses 91/96 octane fuel.

## General News

### Fairey Ultra Light Jet-Powered Helicopter Makes Successful Trials

Fairey Aviation Co. Ltd.'s Ultra Light jet-powered helicopter has completed highly successful trials from the deck of a Naval frigate, the firm reports.

Operating from a small platform on H.M.S. "Grenville" in exceptionally rough weather in the English Channel, the Ultra Light made more than 70



landings and take-offs in winds measured at 62 knots with the deck pitching ten to 12 feet and rolling up to 14 degrees in each direction.

Civilian business application of the helicopter would be valuable for oil companies with water-based rigs.

Head office of Fairey Aviation Co. Ltd. is Hayes, Middlesex, England.

### Air Force Planes To Be Sold To Civilians For Business, Private Use

Air Force has announced that some 1,505 aircraft of different types will be released for sale between now and July 1. According to an Air Force spokesman, the aircraft are readily adaptable to many types of business, commercial and private uses.

Among the planes to be sold are 286 B-25's, a twin-engine aircraft manufactured by North American Aviation, Inc.; 104 C-45G's, twin-engine plane made by Beech Aircraft Corp. (Model 18); 162 T-28A's, single-engine two-place trainer built by North American; 615 B-26's, twin-engine made by Douglas Aircraft Corp.; 84 T-6G's, single-engine two-place trainer made by North American; 100 F-51's, single-engine, single-place made by North American; 116 C-46A/D's, twin-engine cargo plane made by Curtiss-Wright Corp.; 38 L-17's, single-engine, four-passenger plane made by Ryan Aeronautical Co.

Announcement of locations and dates of sales will be made by bases concerned.

### North American Aviation Sub-contracts to Small Business

More than 85 percent of the total outside purchases of materials, parts, subcontracts and services by North American Aviation, Inc., and its divisions during the 1957 fiscal year were made with 10,350 small business concerns . . . those with 500 or less employees . . . Rulon Nagely, corporate director of material, announced.

### Eland-Convair Conversions By PacAero Engineering

CAA certification flight tests of the turboprop Convair 340 powered by Napier Eland engines are underway at PacAero Engineering Corp., Santa Monica, Calif.

PacAero, representing engine manufacturer, D. Napier and Son, Ltd., London, England, in the airworthiness certification, is under a \$1,000,000 contract to convert four aircraft in addition to the flight testing program.

The conversion will be treated as a modification of the original aircraft and not as a new design. The Eland NEL6 turboprop engine, rated at 3,500 ehp for takeoff, gives the converted Convair 340 an additional 2,000 hp compared with the standard piston engine version. Gross weight increase is 6,000 pounds with correspondingly higher payloads.

Production is scheduled to start this month on conversion of Napier's Convair 440. PacAero expects to complete CAA certification this summer.

PacAero is a subsidiary of Pacific Airmotive Corp.

### CAA Warns Of Use Of Improper Fuel Grades In Light Plane Engines

Present-day owner or operator of private aircraft has at his disposal aircraft and engine combinations whose efficiency and high performance characteristics were until recently found only in airline equipment, reports the CAA.

It is most important to use the proper grade of fuel in aircraft equipped with high compression and supercharged engines, CAA urges. At least four accidents in past two years were directly attributable to use of improper fuel grade.

High-performance engines require Grade 91/96 or higher grade fuels. Use of lower grade fuel than specified results in detonation, preignition, overheating, loss of power and resulting engine damage.

### CAA Carrier Certificate Awarded Flightcraft Air Taxi Operation

Flightcraft Inc., Portland, Ore., was awarded a CAA air carrier certificate for day and night, IFR and VFR air taxi operations, Silas King, president, announced.

Charge of flight department is Herbert Lee. Firm has three twin-engine and several single-engine planes for continental-wide service.

### Sensenich Metal Propeller Increases Cessna 170-172 Cruise Speeds

New Sensenich Model M74DR Metal Propeller increases the cruising speed of the Cessna 170 and 172 at least five miles per hour without sacrificing rate of climb, the company claims.

It is a CAA-approved replacement. Sensenich Corp. is at Lancaster, Pa.

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### What They're Saying About SPEED CONTROL

Victor Schrager (above), in charge of aviation operations for Compania Frutera de Astral, S.A., says "In spraying banana crops we get into almost every critical low-speed maneuver possible. We installed SPEED CONTROL for added safety.

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# SAFETY EXCHANGE

## First Banked High Speed Turn-offs At Indianapolis Airport

INDIANAPOLIS, Ind.—First known installation of banked high speed turn-offs and first installation in this country of flush center-line runway and taxi-lights has been completed at Indianapolis Municipal Airport. A new 7,300-foot reinforced concrete runway has three of the quick turn-outs which will permit pilots to clear the main runway at speeds up to 63 mph, according to engineers' calculations.

CAA Technical Development Center installed the flush center-line lights experimentally on one of the turn-offs in order to test their effectiveness in helping the pilot to use the turn-off at night.

Two of the turn-offs will handle planes landing from the southwest on ILS runway 4 while a third will take planes from the northeast. They offer a banking effect to the turning plane by having the inside edges one foot lower than the outside of the curve. The turn-off describes an easy 955-foot radius arc.

CAA has installed the experimental flush center-line lights at the second southwest approach turn-off near the northeast end of the new runway.

They consist of 12 white lights countersunk at 100-foot intervals along the center-line of the new Northeast-Southwest runway, with a line of blue flush lights along the center-line of the high speed turn-off, "peeling off" from the line of white lights.

A light bar of three blue lights, also countersunk in the runway, marks the intersection of runway and high speed turn-off center-lines. In addition, a countersunk flashing blue light, 500 feet ahead of the turn-off, warns the pilot of the coming pull-out.

In practice, the pilot will put the nose of his ship on the line of white lights and peel off at 60 mph onto the turn-off by following the line of blue lights.

## Coded Obstruction Lighting?

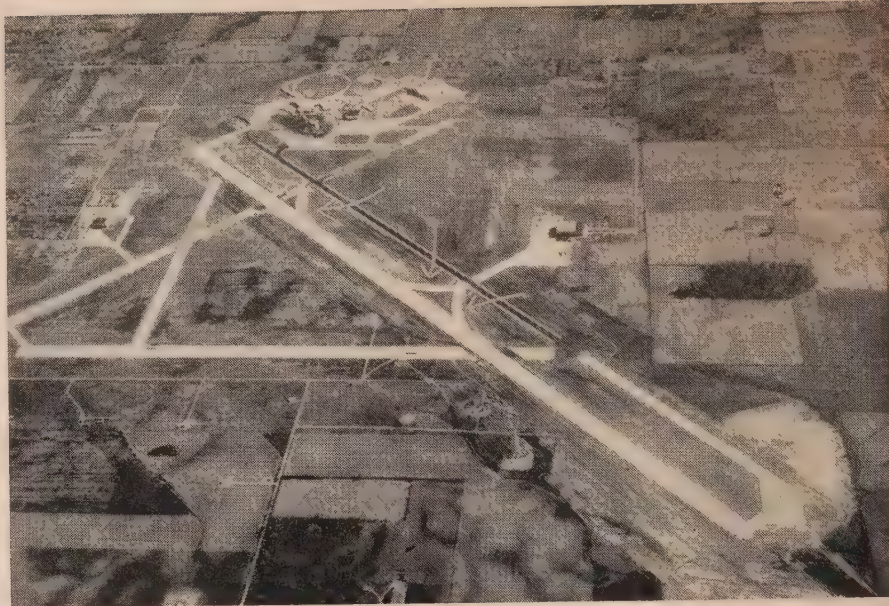
KOL, a regular commercial radio station in Seattle, Wash., has asked the CAA for permission to modify red warning lights on its 413 ft. transmitting towers to blink "KOL" in Morse Code.

In its application the station points out that the towers are in almost direct line with the instrument approach to Boeing Field.

Present CAA regulations prohibit the coding of warning lights to flash a signal of more than two letters. In asking an exception to the ruling, KOL argues that the coding would aid air safety by giving pilots a definite position fix at night.

## Collision Research Continues

The results of accident analysis indicate that 75 percent of the collision



accidents are essentially of the overtaking or gradually converging types; 95 percent of such accidents occur within five miles of the airport; and smaller type aircraft are involved in 75 percent of the collisions. We all are aware that collisions happen on bright sunny days except that a few have occurred at night and during thick weather.

In tests of high-intensity lights, an oscillating, 600-watt, 500,000-c.p., white, incandescent light could be seen at distances up to 18 miles on a bright sunny day. A 900-watt, 2,000,000 c.p., white, mercury vapor arc light could be seen 24 miles away.

High-intensity paint proved effective at ranges up to two miles and particularly when viewed from above with the ground as a background. The radiance of this paint is about four times that of conventional finishes and its durability is comparable. Blaze orange proved to have a maximum visibility although other colors also were effective.

Flight testing of devices for increasing range of vision have included wide angle lenses, rear view mirrors and an optical scanner. Wide angle lenses, 15 inches in diameter, were tested and provided nearly hemispherical vision for the viewer; however, their short range caused by demagnification, and the fact that they distorted the sensing of relative closing speeds, seriously limited their usefulness. The rear view mirror was installed in a transparent, streamlined blister above and forward of the pilot's head. This appears to have considerable promise for use on smaller, lower-speed aircraft as a protection against overtaking collision accidents.

Two new collision projects have been initiated. One of these has to do with terminal area operations in daytime while the other concerns itself with night time cruising conditions as they pertain to external lighting require-

ments. Both will involve extensive collision course flight testing in which pilot reactions will be measured. An exhaustive survey of other basic lighting research is in progress. This will insure the coordinated conduct of the work at Indianapolis.

The daytime collision project authorizes the testing of new daytime conspicuity devices and proximity warning devices as the situation requires. However, the establishment of basic requirements through pilot reaction studies is its major objective. At this time only one such test is planned. A cooperative type of proximity warning device was to be flight tested during the month of December. This utilizes light as the transmitting agent and will sense the general direction from which the airplane is approaching.

(Paper by Alan L. Morse, Chief, Aircraft Div., CAA Tech. Dev. Center, Indianapolis.)

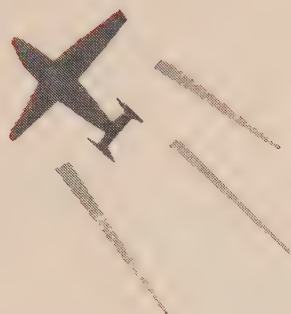
## ATCS Men Save Pilot On Faulty IFR Approach

Two CAA employees of the Santa Barbara, Cal., Air Traffic Communications Station, Raymond Chase and Max Landis, received awards of merit from the Flight Safety Foundation for their quick thinking and overall efficiency in saving the lives of an Army Colonel and his passenger on May 20, 1957.

On arriving over the Santa Barbara Omnirange at the end of an 11-hour flight in turbulent air, the pilot was cleared for approach to the airport by Santa Barbara Radio. Using an approach chart in fine print and a red flashlight to augment poor cockpit lighting, the pilot began his transition to ILS on a heading of 253 degrees, descending to 4,000 feet.

About one minute from the Omni station, CAA Radio called to check the

(Continued on page 30)



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**4. Reciprocal Course** — Numbers always in view, right-side-up. No need to turn a switch.

**5. Heading Changes** — Read directly, in exposed numerals, deviations up to 100 degrees.

**6. ILS Glide Slope Indication** — Glide slope bar gives glide path information identical to that provided by conventional ID-48 instrument.

**7. ILS Localizer Indication** — When tuned to localizer, vertical needle functions exactly like localizer needle of ID-48. Alarm flags for both glide slope and localizer.



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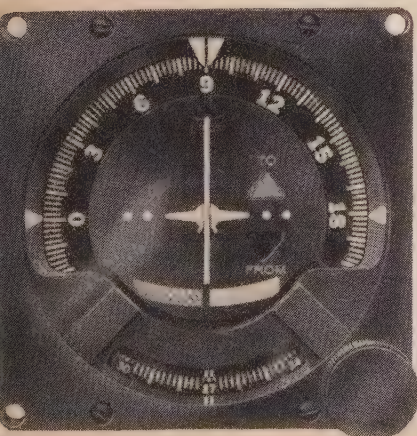
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OMNIMETER AND VORTRAN DISPLAY

# Aircraft Production and Marketing Outlook



*Synopsis of a talk by Joseph T. Geuting Jr., Manager, Utility Airplane Council, Aircraft Industries Association of America, at the 18th Annual Convention of the National Aviation Trades Association, Dallas, Texas*

**G**eneral aviation industry is dimensional in that it has added a third dimension to travel for the modern businessman, agriculture and industry.

General aviation's economic contributions are already dimensionally large. The total dollar volume of the general aviation business is now probably in excess of a billion dollars annually. This is a direct contribution to the national economy resulting from the general aviation business itself. The thought makes me feel I am participating in an industry which has become vital and a real part of our national economy.

The general aircraft marketing and production outlook has been dissected and analyzed countless times since the end of World War II when the industry really came into being as we know it today. The industry will continue for many years to be measurable in terms of steady evolution and not by revolutionary change.

General aviation has no reason to travel at supersonic speeds ten miles above the earth. We just want to continue to supply good, safe transportation in easily flown steadily improved aircraft which cover so much more distance at such speeds as to be incomparable with available forms of surface transportation.

General aviation has not even scratched the surface of the market which exists.

Now in general aviation there is increasing talk about small jets, VTO and STOL type aircraft. Of course, such aircraft will become a part of the general aircraft fleet of the future. But we must live with the present.

We have a variety of fine aircraft to fit almost every conceivable requirement. We have an awareness that a general type aircraft properly used is a valuable business, industrial and agricultural tool. Further, we have well-documented statistical evidence placing general aviation in perspective establishing its substantial and rapidly growing economic importance.

In round numbers the active fleet of general aviation is about 60,000 units. This is 40 times more aircraft than are operated by the nation's domestic air-

lines. Aircraft utilized for business purposes now number at least 20,000. The multi-engine fleet of general aviation, alone, outnumbers the airline fleet several times.

Flying for business purposes has had a five-fold gain in the past ten years, from a little more than 1,000,000 hours in 1946 to 5,000,000 in 1957.

Sales of general type aircraft for 1957 will approximate 6,200 units with a retail value of about \$133,000,000.

A recent survey by one of the major general aircraft makers disclosed that in 1956 27-percent of their sales was to new owners, which also means 73-percent was to a replacement market.

The observation I want to make here is that our industry should be reaching a great many more new owners. We are not an industry which has saturated its market and depends wholly on obsolescing old models to create new sales.

Other evidence that the marketing and production outlook is good includes the General Aviation Facilities Planning Group report which forecasts that general aviation will generate approximately 20,000,000 flying hours annually by 1976 at which time its active fleet will approximate 90,000 aircraft.

Observations of Karl Voelter, general aviation advisor to CAA Administrator, have a bearing on the production and market outlook. He says that in the student pilot phase of general aviation there seems to be renewed vigor. Indicative of this trend is that in October of 1957 the CAA has scored more than 115,000 written examinations, an encouraging sign of renewed activity in this phase. He added that industrial and agricultural phases are both showing tremendous growth.

Another indication of good marketing outlook can be drawn from some figures recently heard quoted disclosing that 65-percent of all civil aircraft are ten or more years old.

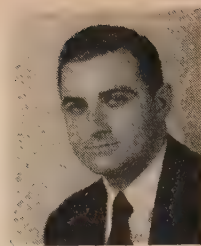
A look at our friends abroad shows that the British aircraft industry has been showing increasing interest in business and executive aircraft.

Referring to the numbers of aircraft utilized in the United States, British  
(Continued on page 35)

# SAFETY DIGEST

**RICHARD W. GROUX,** *Assistant to Executive Director NBAA*

*Compiled and edited from leading air safety publications issued by military, naval, airline, government agencies and from private and business pilots' experiences.*



## Design for Damage

*A Psycho-Analysis of Wheels-Up Landings*  
By Dr. Frank P. Gatling, Human Factors Division, U. S. Naval Aviation Safety Center.

### ARE SOME PLANES MORE PRONE TO WHEELS-UP THAN OTHERS?

What are your chances of injury in a wheels-up?

### WHICH MANEUVER MOST OFTEN PRECEDES A WHEELS-UP?

When does the pilot realize he forgot wheels? what does he do next?

### DO YOU TELESCOPE AND TRANSFER?

As result of 56 special interviews conducted by Naval flight surgeons with pilots who made unintentional wheels-up landings, some answers to the questions above were learned.

This type of accident is more damaging to the budget than lethal, despite its lethal potentiality. Of 56 accidents investigated, none was fatal, two persons received serious injuries, four minor, and 73 received no injury at all. However, these mishaps cost the Navy the tidy sum, in equipment alone, of over three-and-a-half million dollars.

Examination of pilots' training involved in wheels-up landings was made in terms of experience in model in which accident occurred, and in terms of total flying experience. Data is striking. Seventy-eight percent of pilots who made wheels-up landings had less than 300 hours experience in the model at time of accident, and, further, 51 percent had less than 100 hours in the model. The total flying time indicates the same trend. Wheels-up landings tend to occur with greater frequency among pilots with fewer hours.

What do the pilots do when they realize, at long last, that the gear is still securely stored in the fuselage, and the plane's belly is scraping the concrete? Investigation shows that ten added power and attempted a waveoff, but all ten realized they were not going to make it, and cut power. Four tried to lower the gear, none succeeded. Eighteen went through the procedure to secure the engine. The other 24 did nothing. These figures are rather revealing in that they indicate that in only 32 percent of the cases were the pilots psychologically prepared to carry out emergency procedures.

Waveoffs have long been suspect as preliminary maneuver that makes a pilot especially susceptible to a wheels-up landing than a wave-off. This maneuver is the touch-and-go landing. Twenty-seven of the 56 wheels-up landing accidents reviewed occurred follow-

ing a series of touch-and-go landings.

Probably two psychological factors operating here. One is what educational psychologists call "telescoping." It is the nearly universal tendency to omit responses as learning sequence is repeated, the pilot unconsciously abbreviates the landing task by leaving out a step. This step is often the wheels-down response with its easily observed result.

The other factor is a "transfer" effect. Pilot has put his wheels down in a series of previous landings containing exactly the same stimuli as the present one. As stimuli are the same in the two situations, the pilot has a strong tendency to believe, through the medium of transfer effect, that he has made the motions normally connected to these stimuli, i.e., he thinks he had put the wheels-down during this landing situation, but actually he did it in the previous landing sequence.

These two factors help explain the large number of wheels-up landings in which pilot is "certain" he activated wheels-down mechanism. Of the 56 pilots interviewed only three admitted that they "just forgot to lower the wheels." The other 53 were fully convinced that they had lowered the gear. Some of the pilots may have been protecting themselves, but the flight surgeons were convinced that most were telling the truth.

Wheels-up landing accidents are rather spectacular results of an error of omission, rather than commission, and are of importance in themselves, but, perhaps, of greater importance is fact that they are objective evidence of other errors of omission. That is, a sizeable number of pilots are failing to lower their landing gear despite the elaborate warning systems in use—and many who fail are warned in time to prevent the actual landing.

How many other errors of omission are being committed in the landing pattern—or during takeoff and in flight—of which we are unaware? Errors that are resulting in much more serious accidents than wheels-up ones.

Psychological point is that an error of omission is not too difficult to make in spite of fact that pilot is surrounded by warning devices of sounds, lights and flares, etc., and is convinced completely that he has performed the task omitted. This is a most insidious type of error.

### Not Pilot "Goof-Off"

Should the question be asked "are all involuntary wheels-up landings purely psychological?" The answer must be yes. But further investigation of data strongly suggests there is more

than just pilot "goof-off" involved.

Let us compare some wheels-up landing rates. First, comparison of jet rates with prop plane rates indicates large difference. Jets have almost two-and-one-half times as many wheels-up incidents per 10,000 landings as do prop planes.

When we compare single-place jets with single-place props, a large difference still exists. Single-place jet rate is twice that of the single-place prop rate.

When we compare airplane models in their own category we find wide differences too, for example,—wheels-up rate for one jet fighter is nearly three times that of another model jet fighter!

These large differences in the rate at which pilots have wheels-up landings in jets versus props and in specific model versus specific model cast strong suspicion on idea that pilot alone is culprit in these accidents. It appears that in some aircraft situations exist in which pilot is far more susceptible to psychological error than in others. These are situations that have been designed by others and in which pilot is unwilling victim.

This is further illustrated by difference in rates for multiple-seat planes as contrasted with single-seaters. Multiple-seat jet rate is .12; single-seat jet rate, .31, is two-and-one-half times as high. Multiple-seat props have a rate of .08 which is doubled by single-seat prop rate of .16.

There is one psychological variable undoubtedly involved in these rate differences, that is the very strong tendency for humans, when in presence of other humans, to adhere more strictly to socially established regulations, such as landing checkoff procedures.

Distractions were reported during the landing sequence by a little less than half of the wheels-up pilots. This includes ten of the pilots who failed to lower their landing gear following touch-and-go landings. Of course, real question is "when is a distraction distracting?" many distracted pilots avoid a wheels-up landing. This question can not be answered completely, but analysis indicates that a disturbance that forces pilot to postpone lowering his wheels beyond point at which he usually lowers them is most damaging kind of distraction.

In summary, analysis of the 56 wheels-up interviews indicates:

a. that they occur as a complete surprise to the pilot.

b. That touch-and-go landing make a pilot particularly likely to commit an error of omission and make a wheels-

up landing.

c. that many other errors of omission must be occurring.

d. that design factors are strongly involved in causing the pilot to commit errors of omission.—APPROACH—Naval Aviation Safety Review.

(NOTE: In general aviation non-commercial corporate accidents for 1956—ten out of the 55 accidents were gear-up!)

## Busy Bees

"It was one of those beautiful spring mornings with the birds singing and the bees buzzing. This intrepid aviator felt it was a good day to log some easy flying time in a P4Y.

"During takeoff, at about 80 knots, I eased the nose off and shortly after indicating 100 knots the airplane flew itself gently off the ground. Climbing out, with the gear coming up and above 200 feet altitude, I started reducing power. Suddenly I noticed the airspeed was 115 knots and dropping slowly. I left take-off power on and flattened the climb to level flight. Adding to my worries was the fact I was crossing over the admiral's quarters at 300 feet with take-off power rattling the windows.

"By now the airspeed was down to 80 knots and I knew the airplane wouldn't fly that slow, yet I had good response from all controls.

"While looking for the panic button, I switched from static pressure to al-

ternate and airspeed climbed quickly to 145 knots. Once again it was one of those beautiful spring mornings with the birds singing and the bees buzzing and those four fans roaring sweetly. A postflight inspection revealed a couple dozen clover leaves packed in the static vent line by those busy bees."

We know it isn't spring and all, *but water and freezing temperatures can do the same thing to your airspeed indicator*—APPROACH—Naval Aviation Safety Review.

## Four C's

Although second hand, we understand that this bit emanated from a Coast Guard type throttle bender of numerous hours above ground. Let's call it the "Four C's for a LOST AIRCRAFT." If you dislike the word "lost," then call it something else. The point remains that the lad's position is somewhat of a question. The procedure is something like this:

- a. Confess
- b. Climb
- c. Communicate
- d. Comply

It's no disgrace to admit that you are lost. It is better to go ahead and CONFESS early so you can get help while there is time.

CLIMB so that someone will be able to hear you, also remembering that altitude above you is of no use in an emergency.

COMMUNICATE with some facility

and let your trouble be known. Everyone who hears you will be willing to help.

COMPLY with instructions from authorized facilities; they are trained to help you.

Not bad, eh! And remember to check your Radio Facility Chart for instructions on use of the D/F net through military Flight Service.—FLIGHT SERVICE BULLETIN

## Daytime Nightmare

A pilot with 2,300 total hours was assigned to ferry a Twin-Beech and though he had 120 hours in the Beech he had only 1.7 in the last 12 months. The plane captain was to act as observer in the right seat.

Takeoff and climbout to 8000 on top was made on the right main tank, according to the pilot's statement. This took 15 minutes, then fast cruise power was set up. Fuel gage selector was then set on left auxiliary position and noted to read full. After about 12 minutes cruise, both engines quit without warning.

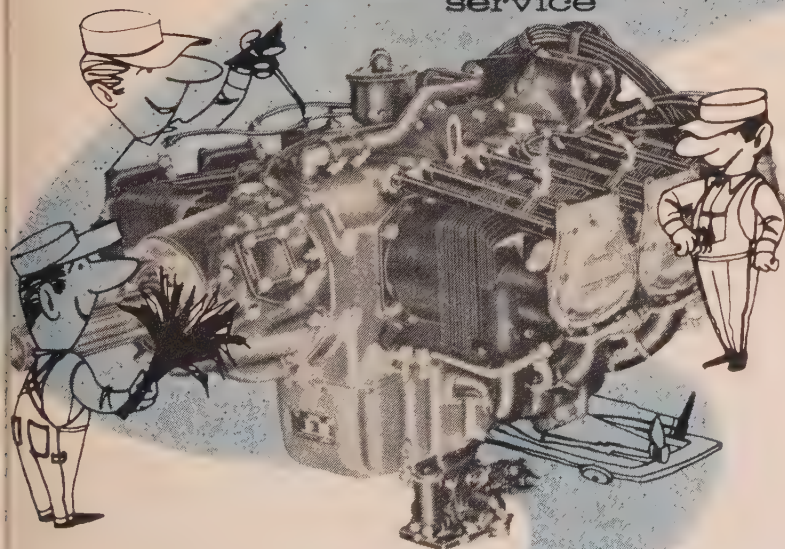
Cloud tops extended to 6,000 feet and ground below was mountainous with elevations from 1,000 to 5,900 feet. First corrective action in the cockpit was to apply FULL carburetor heat followed by FULL RICH mixtures.

Second corrective action, after noting ZERO fuel pressure on both engines, was to select right main tank and op-

complete

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erate wobble pump for about 30 to 45 seconds. Fuel selector valve was then shifted to left main and wobble pump was worked furiously for another 30 to 45 seconds. By then the Twin-Beech was in the soup and no further attempts, other than pumping the throttles, were made to start the engines, due to necessity of gliding on instruments.

The altimeter wound through 2,000 feet of clouds. When it read 3,700 feet the pilot broke out in a small valley under a 200-foot ceiling. He saw a level spot to starboard and a hill directly ahead. Pulling up into a semi-wingover to the right, he went into the overcast then broke out again and landed straight ahead in an open field with no injuries to himself or his observer.

One of accident board's conclusions was that the pilot "exhibited highest qualities of airmanship upon attaining visual contact with the ground."

Salvage party found that right and left main tanks and left auxiliary tank were nearly full. Right aux tank was EMPTY. By utilizing wobble pump it was possible to register fuel pressure on both engine gages, except on the right aux tank, of course. Gasoline was added to this tank and pressure readings were obtained by the wobble pump.

The flight was duplicated in another Beech. Takeoff, climb to 8,000 and cruise was made on right auxiliary tank. After 29 minutes, both fuel pressure gages registered loss of pressure. It was approximately 10 seconds before the wobble pump built up fuel pressure and kept it constant. During flight, it was found that fuel pressure remained constant when the fuel selector valve was positioned midway between two tanks containing fuel but, when positioned midway between a full and an empty tank, a slow fuel pressure loss on both engines was noted in approximately five seconds.

During investigation, plane captain was asked to diagram fuel selector valve set to right main tank. He positioned valve to right auxiliary tank.

Primary error, according to the board, was pilot technique and that fuel starvation was experienced as a result of a dry tank. Most logical conclusion is that takeoff was made on the right aux tank with the pilot believing he was on the right main. It was also concluded that upon reaching cruising altitude he shifted fuel gage selector switch to left aux tank, but before he shifted fuel tank selector valve, he was interrupted and later forgot to shift this valve.

Board is of opinion he did not remain on a full tank long enough for wobble pump to completely clear fuel lines of air.—APPROACH—Naval Aviation Safety Review.

## Bird-Dog Mystery

"I had been holding over the Long Beach range in an F-9F-8 for approximately 20 minutes and then received clearance for a penetration. The penetration was normal in all respects until returning inbound to the station. The

top of the overcast was 3,000 feet, and I leveled off on the top while I was getting a GCA channel.

"Communications established, I reported my position as inbound on the published inbound heading. GCA acknowledged and asked that I report low station. It was not long before I realized that I should have had station passage and I rechecked the ID signal and retuned the station. All was correct and it came in loud and clear.

"I also spun the needle in the loop position and the needle always returned to the nose. Fortunately, I was familiar with the area and realized that I was well past the station. The further inland I went the more the overcast was breaking up and I finally located myself over Norton AFB some 50 miles from Long Beach with the needle still on my nose.

"Due to the unreliable ARN-6 and UHF transmission difficulties, I elected to proceed VFR to George AFB over in the Mojave area. As I finally started to climb my needle spun around several times and finally pointed back at the station, much too late to be of any help to me at this stage of the game.

"Why this happened I do not know. With George AFB homer tuned in, the set operated properly and gave good indications. I had the set checked, and, it ground-checked OK. All leads were tightened and the set has operated properly since.

"This is the second time that I have had a good ID signal and yet the needle was 180 degrees out of phase. The first time it happened, I became aware of the danger of such a situation, but made no effort to find a remedy for such a problem. It is the feeling of many aviators, that if the needle is tuned in properly it will always point in the right direction and if not, there is nothing else you can depend on. As always said, you have to believe your instruments.

"This is the fallacy of this situation: You do not have to believe your instrument if you take the time to figure out when you should recross the station on your inbound heading after leaving high station. Some fields that leave little time to continue over a station without danger of colliding with the side of a mountain even if the instruments are all reading correctly.

"It is seldom anyone has to use emergency altitude given on all letdown plates, but this is about the best time I can think of using such information.

"Someone else may be in the soup and may not be as lucky as I was to be VFR at the rare time the phenomenon occurs. I know that I will time all of my penetrations so that I know what time I should be over the low station."

Some others have not been as lucky. —APPROACH—Naval Aviation Safety Review.

## Hot Engines Ignite Sprayed Solvent

Two incidents of aircraft fires on the ground have occurred to different airlines. Reason for both fires is identical.

The planes had been checked for an engine malfunction. Immediately upon return to the service area, engines

were washed with cleaning solvent.

Soon after spraying, fires developed. In one case, fire and a minor explosion occurred. Solvent flash point is about 105 degrees Fahrenheit when used in spray form.

To prevent this:

1. Do not spray or wash engines with solvent before engines have cooled to a safe temperature.

2. Make a visual check of engines for residual fire.

3. Battery switches must be off and power unit shut down.

(National Safety Council — Air Transport Section)

## Self-Medication Rx for an Accident

By Maj. George R. Anderson

Chief, Aviation Medicine Branch  
Office of SAC Surgeon

Since the dawn of history man has practiced medicine in one form or another.

In our present age the practice of self-medication, or treatment of physical conditions, reflects the axiom that there is a little of the doctor in all of us. However, the use of herbs and simple remedies of a few short decades ago was an entirely different practice compared to modern use of highly powerful specific drugs.

Of primary importance in the treatment of any medical condition is the need of an accurate diagnosis. The drugs in common usage today are of a specific nature and are for only certain diseases or conditions. The improper use of a drug may not only fail to help an individual—it may cause serious harm. It must be remembered that all drugs or medicines usually taken are not normally found in the human body and therefore can be considered potential poisons.

### Physician Uses Guidepost

Federal and state laws allow for a wide range of drugs which can be obtained without prescription. The fact that a medicine is prescription-exempt does not mean that it contains no toxic properties. The indiscriminate selling of medicines by some druggists is motivated by the desire for profit rather than any concern for the patient's well-being. It is easily understood that the prescriber in these cases does not have the benefit of a dependable diagnosis nor the knowledge of the most appropriate treatment.

The demands of modern flying are so great that the full physical and mental capabilities of the individual are necessary for safe operation. The flight surgeon is a highly trained physician with specialized knowledge of the effects flying has on the human body. The influence of drugs on flying has been approached by scientific methods and the results of these studies are the guideposts he uses in prescribing medicines to flying personnel. Therefore, the flight surgeon has been given the responsibility for treating flyers rather than physicians who are specialists in other fields.

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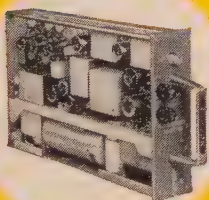
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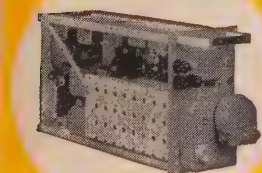
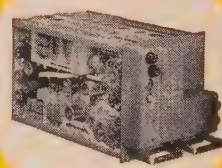
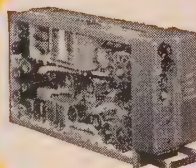


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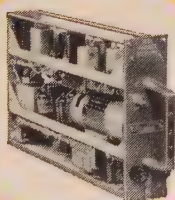


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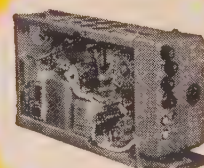
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### Complicated Machine

The mere fact that an individual has a physical condition which requires medication may in itself indicate that he should not fly. The altered physical state of the individual when ill, as well as the effect of the medication, may greatly jeopardize the individual's usual normal functions. It must be remembered that all medications have some effect on the human body. It is only a matter of degree which determines whether or not it is beneficial or poisonous.

The human body is an extremely complicated machine. It depends upon integrated and balanced action by its vital organs and systems. Medical treatment necessarily causes some deviation from the normal action. If the deviation continues improperly controlled, it may become harmful. It is this deviation which is of primary concern here. A medicine which is not appropriate may upset this balance to such a degree that the individual can suffer from what is commonly known as "side effects" or "drug reaction."

The military pharmacy carries in its stock a wide range of medicines which, if appropriately used, give curative powers equal to any pharmacy or drug-store in the world. By the same token, the medicines which can give the most dire results, if misused, are also present. A person on flying status treated in a military medical facility should have no fears concerning the use of medicines if the fact that he is on flying status has been made known.

### Drugs Create Hazard

The treatment of a common cold can lead to difficulties if the medicines used are not understood. The use of antihistamines is advertised daily over radio and television to aid in the relief of the "sniffles," "headache" and "ache-all-over" feeling of the common cold. They do give relief in the treatment of a cold, but their side effects may ser-

iously threaten safe flying. Individual response to antihistamines varies from no effect in some cases to extreme drowsiness and even depression in other persons. These drugs depress the balance system and decrease depth perception, thus creating a definite hazard if attempts to fly are made while using them.

Nose drops also should be taken with care. Due to the great absorptive power of the mucous lining of the nasal passages, nose drops are absorbed and may cause blurred vision, pounding heart, rapid pulse, incoordination; and again a hazardous situation is present. Prophylactic drugs, such as quinine, used as an antimalarial treatment, frequently cause ringing in the ears and occasionally deafness, even though taken in comparatively small doses. The use of atropine-like substances which are frequently found in banthine and "airsick" pills, will cause sufficient blurring of vision to be dangerous.

### Beware of Tranquilizers

Another of the more recent "boons to mankind" is a group of medicines called "tranquilizers." The desire for a harmless pill that will magically relieve or dispel the everyday stresses and strains has always been sought by man. The "tranquilizers" are quite useful in the treatment of mental or emotional disturbances, temporary anxieties and tensions, but they also have quite undesirable side effects that greatly decrease the effectiveness of flying personnel. They may cause severe episodes of diarrhea, with cramps, gas and watery stools. They may also cause double vision, accompanied by nausea and generalized skin reactions in persons with no previous history of allergies. In others, an effect opposite that desired has occurred, manifested by extreme excitement rather than blissful tranquility. In general, however, the effect of the tranquilizer is to give a false sense of security—and this is

definitely not a desired trait while flying.

Amphetamines (dexedrine, benzedrine "go" pills, etc.) have their primary action on the central nervous system. The individual tolerance to these drugs is such that an overdose is easily taken. Overstimulation leads to confusion, nervousness and loss of appetite. Once the effect is worn off, one has an extremely acute period of fatigue which is known as "rebound" or "letdown." The use of amphetamines only postpones the need for sleep and adequate rest, and cannot be considered a substitute.

The use of oral antibiotics—such as aureomycin—can cause in certain individuals a severe diarrhea leading to a loss of large amounts of body fluids. Actually, any disease which would warrant the use of such highly specific medication should result in temporary grounding.

Self-treatment by individuals does not always involve the use of drugs but procedures which can be equally as dangerous. The pinching of a boil on the face or nose can lead to a fatal infection of the brain. The removal of foreign bodies from the eye can lead to serious infections or scratches on the cornea if not properly removed and treated for infection. Special precautions must always be taken when removing splinters, breaking blisters, or treating burns, abrasions and lacerations. It is important to understand the limits necessary in applying any external medicines to the skin since many people are allergic and severe skin reactions may occur.

A modification of diet is a form of medical treatment since the necessary nutritional requirements remain the same while the foods available are modified. There is no such thing as an absolutely perfect diet, only an adequate diet. The human body requires a certain amount of fat, protein, carbohydrates, minerals and vitamins. Any

(Continued on page 39)

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# Maintenance Bulletin

These maintenance notes are compiled and edited from recent CAA air carrier maintenance branch and general aviation maintenance summaries, and are mailed to all NBAA members as part of their membership service.

## AERO COMMANDER

### Model 680

Accessory Housing Cover Assembly P/N-68440—The subject part was found cracked. Crack emanates in proximity of mounting stud boss adjacent to raised starter mounting flange.

## BEECHCRAFT

### Model C-35

Left Exhaust Muffler P/N-D-186—Heat exchanger slugs or "pips," which screw into the muffler skin and extend into the cabin heat chamber, were severely burned, resulting in them falling out. This leaves hole which allows exhaust gases to enter cabin heat chamber and flow into cabin.

### Model H-35

Oil Dip Stick Tube—Bracket which retains oil dip stick tube was bent, allowing the tube to pull away from crankcase, resulting in an oil leak.

Vacuum Line—(Vacuum Pump to Vacuum Regulator)—Incorrect instrument readings were attributed to the subject line collapsing at the 90-degree bend.

### Model 50

Spinner Dome Retaining Bolt—Spinner retaining bolt failed at base of bolt head, resulting in spinner leaving aircraft and striking fuselage.

### Model B-50

Rudder Torque Tube—Lower Fitting P/N-50-630015—Inspection disclosed cracks in subject fitting, apparently resulting from not having a rudder lock.

### Model C-50

Nut Assembly—Landing Gear Actuator P/N-50-180170-IL—Difficulty was encountered upon lowering gear, resulting from the nut assembly separating from the actuator rod, allowing nose gear to swing free. Examination of part disclosed only 50 percent solder coverage in brazing nut assembly to actuator rod.

### Model D-50

Shaft Assembly, Carburetor Air Valve P/N-50-970038-6—The needle type bearing on each end of the subject part failed, apparently from vibration. This resulted in the needle rollers dropping from their cage into the air scoop.

## CESSNA

### Model 172

Fuel Line—Inspection disclosed that the flap cable turnbuckles were chafing the fuel lines. Point of contact was approximately middle of the rear door post.

### Model 182

Carburetor Throttle Arm P/N-12-A254—The throttle arm on Marvel/Schebler carburetor (MA-4-5, P/N-10-396541) failed completely in area of throttle control attach hole.

(Continental O-470-L)—Spark Plug Lead—Difficulty has been encountered when the lead elbow at the spark plug

is turned toward the exhaust manifold. The heat from the manifold melts the solder and chars the wire insulation. When making spark plug installation it is suggested that elbow be turned away from the manifold in order to impede the aforesaid condition.

### Model 310

Cabin Heater Tube—Exhaust P/N-0813900-10—The subject part failed, due to rust, immediately below connection to the heater exhaust outlet. Inspection of condition disclosed that a formation of exhaust deposit had built around the bolt, which passes through and attaches the tube to the heater, resulting in a partial restriction.

Rib Assembly Tip Center P/N-0822350-201—and 202—There have been instances reported of the wing tip ribs buckling in proximity of the rear attach bolt for the wing tip tank.

Left Fuel Selector Valve—Subject part became inoperative when roll pin, P/N-52-028-125-0562, slipped out of U-joint, P/N-0820000-12, on fuel valve torque tube. This particular U-joint is accessible by removing bottom wing rod fairing. Operator reports correcting condition by replacing roll pin by installing clevis pin with cotter pin.

Check Valves—Fuel Control Housing—During periodic inspection, it was noted that fuel pressure was recorded on both gauges when moving selector to either tank position with the boost pump "on." Inspection disclosed dirty and corroded check valve in fuel control housing.

## CONVAIR

### Model 240

LaGuardia. Main landing gears collapsed in hangar during maintenance operation. Aircraft had been jacked to change nose gear strut seals and the gear handle had been placed in the "up" position to break the downlock. After job was completed and jacks removed, the emergency hydraulic pump switch in nose gear well was actuated to operate the canopy stairs to the full "down" position. At this time the main gears retracted. Tail section settled on supply cart and left wing settled on cabin service tractor. Damage to left wing will require aileron change and repair to outer wing hinge. Tail damage in area between station 722 and 797 requires skin and stringer repairs. One left propeller blade tip bent and both upper nacelle longerons bent because of load. Replacing engine, propeller and longerons.

Supercharger failure resulting in smoke in cabin. An inspection of the supercharger in our shops revealed an impeller failure as a result of a flow control malfunction. The flow control linkage to the dip stick became disconnected due to loss of a Tru-arc ring.

Impeller overspeed resulted. Lubricating oil leaking through the impeller eventually reached the cabin and cockpit area as smoke.

Emergency landing resulted from loss of hydraulic fluid. Investigation revealed nose gear steering cylinder was replaced, at which time steering cables were disconnected. This allowed slack cable under cockpit floor to flip over dog leg of landing gear selector valve return line, when cables were reconnected. This condition resulted in the cable wearing a hole in top of the line. Cable is normally routed under the line. Failure was breaking off of head from front countershaft bolt, P/N-184791. Front section of crankshaft also cracked due to this original failure. No further discrepancies found. All bolts, P/N-184791, are being replaced with, P/N-304468.

During taxi out nose steering cylinder cracked. Lost all hydraulic pressure. Unable to steer or brake. Aircraft swerved off taxi way into shallow ditch. All blades right propeller damaged. No other aircraft damage or injuries. Landing gear inspected and operation checked. Propeller and nose steering cylinder replaced.

Left propeller went into autofeather on takeoff. Failure was breaking off of head from front countershaft bolt, P/N-184791. Front section of crankshaft also cracked due to this original failure. No further discrepancies found. All bolts, P/N-184791, are being replaced with, P/N-304468.

### Model 340

On takeoff, threw tread from No. 4 tire. This tire was a fifth retreaded tire. Evidence of carcass failure which would indicate poor adhesion. In the process of leaving the tire, the flapping tread damaged the right lower nacelle structure from Station 200 aft to the trailing edge. It was also necessary to replace the right wing flap due to damage. The right hand fuel crossfeed valve body was cracked causing an extensive fuel leak. There was also considerable damage and looseness found in other fluid lines and electrical conduit in the nacelle area. It is estimated that approximately 500 man-hours will be required to make repairs. The tire has been given to the manufacturer for detailed inspection.

### Model 440

En route right engine developed oil leak and engine RPM increased to 3200-3300. Unable to control RPM with propeller governor and unable to feather propeller. Engine frozen by actuating firewall shutoff valves. Preliminary investigation revealed three propeller governor mounting studs broken.

## CURTISS-WRIGHT

### Model C-46

Thirty minutes from destination hydraulic gauges fluctuated. One gallon fluid added. Emergency gear system used to extend gear because of no system pressure. Metal line in pressure side from engine pump cracked in left wheel well.

## DEHAVILLAND

### Model 114

Propeller Spinner Backplate—Inspection disclosed that two of the four propeller spinner backing plates had developed cracks.

## DOUGLAS

### Model DC-3

Pesco Fuel Pump—Relief Valve P/N-R-600-89F—It has come to our attention that one of the subject relief valves failed in flight. Failure of this part permitted raw fuel to eventually flow into the exhaust stream where it readily caught fire. Examination of the part revealed that failure had occurred at the spring abutting end which was only .012-in. thick. Normal thickness at this point is over .100-in. According to the information at hand, this defect might have occurred at the time of manufacture or could have occurred at overhaul

after the valve had been refaced a number of times.

Left engine oil temperature increased and pressure dropped. Inspection revealed master rod bearing failed. Only apparent reason for failure, possibility of metal in oil cooler from previous engine failure. Manufacturer's procedure being followed in cleaning contaminated coolers, however, X-ray being considered for future inspection of contaminated coolers.

This refers to a report that the right engine propeller was feathered due to high oil and cylinder head temperature. The engine at initial inspection revealed a failed master rod bearing, P/N-117971. Supplemental Report. The time between overhauls on the G-200 is voluntarily being reduced to 1,500 hours, and master rod bearings are being replaced with new bearings as each engine is overhauled. The time will be returned to 1,600 hours upon completion of the project. TSO 1270:29 hours. On descent for landing, bird struck left front windshield panel coming into cockpit. Temperature 15 degrees C, altitude 2,400 feet MSL, airspeed 152 knots, weight of bird approximately one pound. Believed to be a night hawk. No injuries to flight personnel. Windshield replaced.

### Model DC-3-A

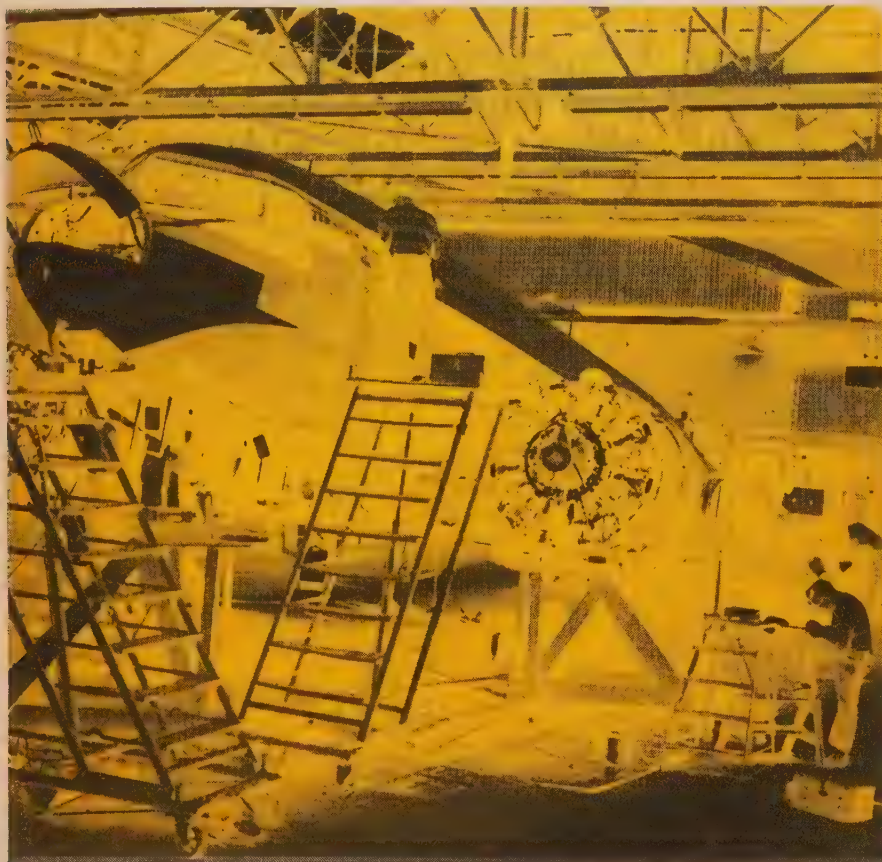
Supplemental Report. Disassembly found Nos. 4, 8 and 10 pistons badly peened with aluminum flaking in top lands. No. 1 piston top compression ring missing, piston gouged and peened, all oil rings stuck. No. 3 piston peened with aluminum flaking in top lands. Exhaust valve keeper broken in No. 7 cylinder and top compression ring stuck. No. 5 cylinder split open from front to rear spark plugs bushings with both valve heads gone from stems, stems still held by keepers. Also exhaust valve seat missing. No. 5 piston peened through head. Master rod damaged by parts entering power section. Pistons in No. 9 and No. 11 also badly peened. Blower section showed no evidence of damage. Exact initial failure not determinable; however, believe No. 5 cylinder and piston.

On lowering landing gear on approach, hydraulic pressure dropped to 270 pounds. Landing made with hydraulic pressure low. Ground inspection revealed hydraulic pressure line half-inch heavy wall tubing at 90-degree bend cracked about half-inch long.

Right landing gear wheel well door actuating rod, Ben Howard P/N 2004-11, found broken at end attached to door. Both right gear doors removed and airplane ferried to Houston for repairs. No damage to door assembly or airplane aside from the broken actuating rod. The failure might have been caused by the installation of a lock nut on the threaded end of an adjustable eye bolt attaching the rod to the door which placed a stress on the rod during closing and opening. Lock nuts have been removed.

### Model DC-3-C

Left gear would not extend. The ground inspection at St. Louis revealed an



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## AERO CORPORATION

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AN509-1032 screw binding the slide assembly, P/N 12.094.1001-6, in the track assembly, P/N12.094-1001-1, of the gear doors, due to wear of the counter-sink hole in the aluminum track assembly which allowed the AN032 screw to stick up and catch the slide mechanism.

## HILLER HELICOPTER

### Model UH-12A

Cooling Fan Gear Box Support Bracket P/N-74122—The subject part, which is mounted on forward side of engine and retains cooling fan gear box, was found cracked.

## LOCKHEED

### Model 18

Bulkhead—Inspection disclosed crack in bulkhead at left side tail wheel shock fitting.

## MOONEY

### Mark 20

Fuel Pressure Gauge Line—A recent report indicated that difficulty has been encountered relative to the aluminum fuel pressure gauge line failing adjacent to the fitting where it connects the fuel inlet line to the carburetor.

## NORTH AMERICAN

### Model B-25

Cylinder Failure—B-25 aircraft have been involved in serious accidents as a result of engine cylinder head failure during flight. This type of failure is

precipitated by cracked cylinder heads and loosening of the head from the barrel. Available information indicates that several of the cause factors responsible for these failures are age of the affected cylinders and engine overboost—especially during takeoff. An hydraulic fixture has been used to pressure-test all cylinders during overhaul. (USAF—Maintenance Review)

Landing Gear Axles. Failure of landing gear axles and/or struts result not only in major accidents, but invariably cause the aircraft to leave the runway and proceed into unprepared areas, the boon-docks, buildings, refueling pits, etc. On B-25 aircraft, the main gear axles have been cracking and breaking in the brake-flange and axle bearing area. To correct this problem a Magnaflux or dye penetrant inspection of all axles is required. (USAF—Maintenance Review)

## PIPER

### PA-20

Exhaust Muffler—Reduced RPM was attributed to internal muffler failure. Muffler can readily be inspected by looking into exhaust pipe, aided by flashlight, to determine condition of the perforated tube and baffle.

### Model PA-22

Fire Extinguisher (CO2 Type)—Unintentional discharge of a CO2 type fire extinguisher has occurred. Investigation disclosed extinguisher was mounted in direct blast of the hot air heater.

Marvel-Schebler MA-4SPA—Engine stoppage was experienced on climbout. Inspection disclosed back suction economizer jet was not installed in carburetor. Report indicated several aircraft inspected were found to have the subject part missing.

### Model PA-23

Outboard Flap Rib—Outboard flap rib and doubler were found cracked where they attach the flap spar. Lowering flaps at excessive air speeds may be attributed to the aforesaid failure.

Stack Assembly Exhaust—The exhaust pipe failed in proximity of the flange at right front cylinder, allowing stack to "ride" on cowl. Inspection disclosed clamp assembly, P/N-18934-00, missing, which obviously aggravated the condition.

Heater Fuel Valve—Gasoline fumes were evident in cabin subsequent to turning off subject valve. Inspection disclosed that when subject valve was in "off" position, fuel leakage would take place at packing nut. This particular valve utilizes an "O" ring to seal packing nut. However, further inspection disclosed that design of valve is such that packing is on pressure side, which accounts for constant leakage when valve is in "off" position.

## GENERAL

### Carburetor Icing:

Icing of the Hayes Scoop/Bendix Carburetor Installation has caused serious accidents involving loss of aircraft. Car-

# General News

## Hull-Type Amphibious Helicopter Offers Higher Landing-Speeds

Edo Corp., College Point, N.Y., has completed flight tests of a U.S. Navy Bureau of Aeronautics HUP-2 helicopter which has been converted to a hull-type amphibian aircraft.

Uses of the amphibious research helicopter include improved safety in over-

Flight tests were made by Philip Camerano, Vertol Aircraft Corp. test pilot.

## Republic To Assemble, Sell Sud Aviation's Jet Alouette 'Copter

Alouette II, jet-powered French helicopter, will be assembled and marketed by Republic Aviation Corp. First deliveries are promised this month.

The market for Alouettes includes corporations operating executive aircraft, off-shore oil companies, mining firms, commercial transport services, government agencies and all branches of the military, said Mundy I. Peale, Republic president. First roto-jet craft will be assembled with French-built components, according to a joint announcement by Georges Hereil, president and director general of Sud Aviation, producer of the Alouette, and Peale.

All sales, production and flight testing will be handled by Republic's newly-formed Helicopter Division, headed by Herbert H. Munsey. The division will be at Farmingdale, N.Y.

Republic's agreement with Sud Aviation, Europe's largest aircraft manufacturer, gives the Farmingdale firm exclusive rights to manufacture and sell the Alouette in the United States and Canada, and includes sales rights in

Alaska, Hawaii, Puerto Rico and Central American countries.

Decision to market the Alouette is the result of enthusiastic interest in the craft when it made a nation-wide tour last summer. Two Alouettes flew a combined total of 26,000 miles, were demonstrated before more than 100,000 persons and carried 2,200 passengers. During the tour the craft set a maintenance record of less than one hour for each hour of flight, Peale said. He compared the figure with "the U.S. national average for helicopters of eight hours maintenance for each hour of flight."

The Alouette is a five-place, medium range (345 miles) roto-jet capable of 122 mph speed. Advantages of its 360 hp Artouste IIB-1 gas turbine engine, produced by Turbomeca of France, include elimination of warm-up time, better cold weather and high altitude performance, elimination of engine vibration and instantaneous power response at no sacrifice to roto rpm. A newly designed governing system eliminates the need for pitch and throttle coordination by the pilot which is a requirement in conventional helicopters.

Maj. Gen. James Ferguson, director of requirements, USAF Headquarters, said that the Alouette "definitely should create enthusiasm within the civilian market."



water ferrying of personnel and aircraft. Application could be made to civil 'copters for business use.

Initial test landings were at forward speeds of 30 knots in one-and-a-half-foot waves. Taxing was done at 15 knots through two-and-a-half-foot steamer swells. Wind velocity varied from 12 to 15 knots. The craft was taxied upwind, downwind, crosswind and made 360-degree turns, pivoting around one float. Closeness of rotors to the water proved that 'copter was able to lift heavier loads off water than off land.

buretor icing has been reported during ground runup, takeoff and inflight under a variety of atmospheric conditions. In some cases, reports of carburetor heat in excess of redline limits was required to keep engines operating. Causes for this problem have been suggested as design of air scoop (no moisture separator), excessive fuel vaporization at blower inlet, improper fuel metering and insufficient carburetor heat being applied at time of entrance into icing conditions.

AMC, Hayes Aircraft Co., and Bendix Products Div. are presently conducting a joint investigation and test program in an effort to determine exact causes responsible and prepare a fix for this problem.

#### Corrosion Removal:

The following steps are suggested when treating a corroded area which appears as a white powdery deposit.

1. Remove corrosion products by rubbing with aluminum wool, using kerosene as a lubricant.
2. Clean surface with Toluene or equivalent grease-removing solvent.
3. Wash treated area with a 10 per cent chromic acid and water solution.
4. Allow solution to stand on metal for ten to 15 minutes.
5. Wash with clean cold water.
6. Smooth radius and fair into unaffected part of the channel leg (local areas only).
7. Clean and prime.

(Caution—First check for approved corrosion removal limits.)

#### CAA Flight Operations and Airworthiness Release No. 418:

Subject: Hazards Resulting From Use of Improper Grades of Fuel in High Compression or Supercharged Aircraft Engines.

An important problem concerns the use of an improper grade of fuel in aircraft equipped with high compression and supercharged engines. Our accident analysis files reveal that at least four accidents within the past two years were directly attributable to the use of fuel of improper grade and doubtless it was a contributing factor in other accidents where the cause was not clearly determined. High-performance engines require Grade 91/96 or higher grade fuels, and a placard specifying the correct grade of fuel is installed in the aircraft on or in the vicinity of the fuel tank filler cap. The use of fuel of lower grade than that specified by the engine manufacturer will result in detonation, preignition, overheating, loss of power and resultant damage to the engines.

The widespread use of these high-performance engines requires greater vigilance on the part of all individuals associated with their servicing, operation and maintenance. This includes not only pilots and mechanics, but also the line personnel who are responsible for putting the fuel in the aircraft. The inadvertent servicing of an aircraft with an improper grade of fuel could have

serious or fatal consequences, and for that reason those persons responsible should be fully aware of the necessity for using only the grade of fuel required for the particular engine. In cases where the required grade of fuel is not available, it is generally permissible to use fuel of the next higher grade, but never fuel of a grade lower than that required.

Owners and operators of aircraft having these high compression or supercharged engines can assist flight line servicing personnel by stencilling "USE ONLY GRADE—FUEL" on the engine nacelle or nacelles where it will be in plain view. Too often, the markings specifying the grade of fuel to be used are obliterated or rendered unreadable by dirt or wear and usually these original markings are small and difficult to read at any time. The use of the stencilled instructions with letters at least one inch high in a prominent place would do much to preclude mistakes by line service attendants.

*(In order that this bulletin can better serve as a maintenance exchange medium for business aircraft operators—we need your experiences, tips, and suggestions. We can help ourselves by helping each other.)*

#### Safety Exchange

*(Continued from page 18)*

pilot's heading and altitude, and when told what they were the operator advised the pilot, in a voice deliberately free of anxiety, that he was descending into a mountain. A pull up and turn seaward allowed time for re-orientation on the Omni and an uneventful transition to ILS on the proper heading of 105 degrees at 5,000 feet. As the operator had suspected, the pilot had read the wrong line on the approach chart.

#### Winter Cautions

With the coming of winter, have you checked your aircraft for carbon monoxide leaks—normally experienced in craft using exhaust manifold cabin heaters?

Remember frost or snow on wings reduces lift and should be carefully removed. Ice also gathers on props while warming up under some conditions and should be removed before takeoff.

Most of the winter season will be inductive to carburetor icing—it can form in the carburetor at temperatures far above freezing, and generally does. Keep a sharp eye on your gauges and apply carburetor heat at the first drop in r.p.m. or manifold pressure.

Water in the fuel system, caused by condensation or otherwise, is another cold weather problem and no satisfactory means has ever been found for thawing a frozen fuel line while in flight. All drain taps and sumps should be given regular checks. New solvents for gas tanks hold water in suspension and consume it with the gas.

A take-off may often be made under

non-freezing temperatures with water settling to the rear of the gas tank during takeoff and climbout to cruise altitude. In many instances, level flight not being attained until freezing levels are reached—the resultant frozen fuel line can be the biggest emergency you ever live through.

Gas tank vents also come into their own for regular checks after rains, snow or sleet. If the gas tank can't breathe to replace consumed gasoline, your engine may run just long enough to get you well into the air. A little thinking beforehand may save your life.

Winter plane accidents caused by engine stoppage due to idling failure outnumber any other type of engine failure accident. Idling failure is caused primarily by fuel starvation.

When the engine is idled while in flight, the tendency of the prop to "windmill" induces a higher engine rpm than that for which the carburetor has been set, resulting in a "lean" mixture. Cold weather slows down the vaporization of the fuel and further "leans" the fuel-air mixture. In a prolonged glide the engine cools off and further aggravates the condition.

#### Cold Weather Warmup

Recently a low-time light airplane engine was extensively damaged by improper warm-up procedure.

Today's light plane engines are tightly cowled and with such a low-drag cowling design it is nearly impossible to get an adequate air flow around the cylinders unless the airplane is airborne.

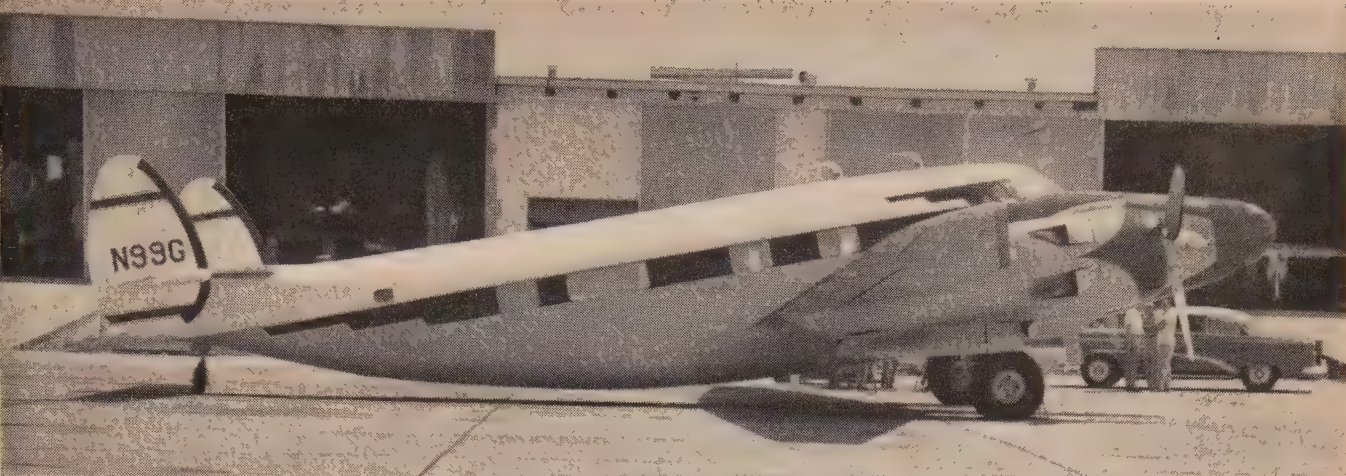
While on the ground, during taxi and run-up, the low volume of air flow allows the cylinder walls to become overheated. The longer the ground running time, the higher the cylinder wall temperature.

Take-off with excessively high cylinder temperature could result in too rapid cooling when a high volume of air commences to flow over the cylinders thereby rapidly carrying away a good portion of the heat. Cylinder walls then cool more rapidly than the pistons inducing excessive cylinder wear and scoring of the cylinders and, in some instances, freezing of the engine.

Starting and run-up procedures should be conducted in accord with the Airplane Flight Manual or the engine manufacturer's recommendations and should be tempered with good judgment.

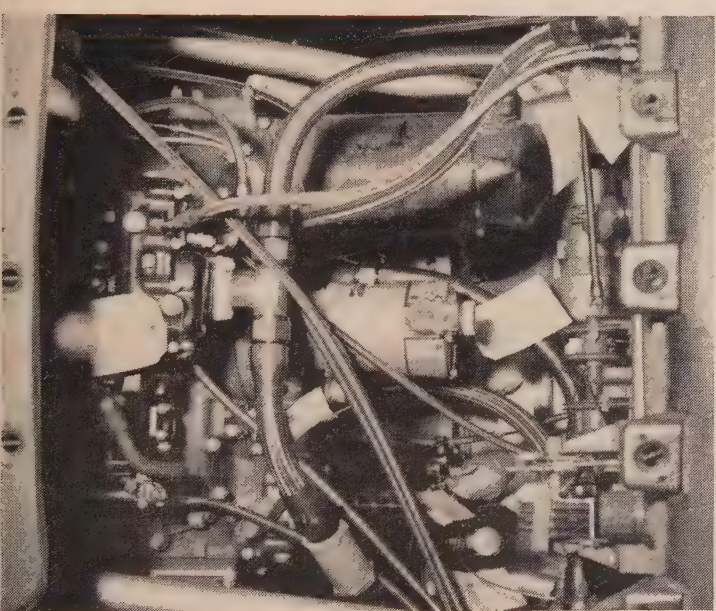
Cylinder head temperature and oil temperature gauges lag behind the actual conditions—therefore, excessive ground operation of the engine should be avoided. Running up the engine into the wind will induce better cooling.

If, during the mag check and a brief higher r.p.m. check, the oil pressure remains steady and doesn't surge and the engine takes throttle without cough or backfire, the airplane is generally ready for takeoff. Many operators, due to better lubricants, are using lighter oils and no more warm-up than taxiing into takeoff position with excellent results. Rudder Flutter—Idaho State Dept. of Aeronautics.



A Super Ventura recently completed by Howard Aero, Inc., of San Antonio.

# Howard Aero, Inc., Builder of Super Venturas, Standardizes On Aeroquip 601 Lightweight Engine Hose FOR ENGINE FUEL AND LUBE OIL LINES



This P&W R-2800 engine on a Super Ventura uses Aeroquip 601 Hose and Reusable "little gem" Fittings for all fuel and oil lines.

"little gem" is an Aeroquip Trademark

Building luxury and efficiency into a business aircraft is the specialty of Howard Aero, Inc. Howard's busy San Antonio plant turns out a sleek new Super Ventura every three weeks. And, each of these executive planes uses Aeroquip 601 Lightweight Engine Hose for all engine fuel and lube oil lines.

Aeroquip 601 Lightweight Engine Hose offers savings up to 44% in weight and 42% in space (smaller bend radii) over conventional hose lines.

Get full information on this and other Aeroquip Aircraft Products from the authorized distributor listed below.



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Miami Springs, Florida
- Airwork Corporation,** Atlanta, Ga.;  
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# the PAGAN

They thought up the name with care to be sure to identify properly the new Beechcraft D-18 modernization. Chamberlain Aviation, Inc. (Cair) Akron, O., picked Pagan because it fits the sleek-appearing hybrid.

Modern design and creative engineering have taken the Pagan beyond the ordinary concept of executive conversion, says Cair. Inside and out it is virtually a new airplane that combines a host of advanced features for more convenient, more efficient air transportation.

First Pagan version of the D-18 has been delivered to Gerstenslager Co., manufacturer of custom-built truck bodies, Wooster, O.

Cair says that improved flight characteristics of the Pagan are the result of a group of basic modifications. Many drag-producing protrusions have been eliminated to "clean" the exterior. An improved center of balance has been gained by relocating certain elements.

The Pagan is a truly practical business transport, says Cair. From its lightweight, three-blade propellers to its unique, streamlined tail gear enclosure, the plane possesses many new high-performance features for increased speed, safety, range and useful payload.

The interior is designed to provide restful and convenient air travel. Carefully engineered structural changes have made the modernized executive compartment as spacious and comfortable as it looks.

Soundproofing materials minimize cabin noise. New ventilating and lighting systems increase passenger comfort. Every bit of the D-18 transformation is done by Cair.

Some of the unique features include a modernized fiberglass nose, power plant improvements, streamlined tail gear door, squared-off wing tips, step door, enlarged instrument panel and large picture windows.

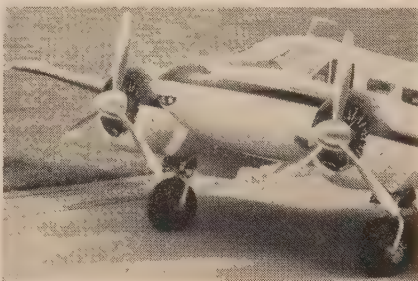
Standard radio installation provides dual VHF communication, dual VHF navigation, single ADF, single Marker, single Glide Slope and dual isolation and speaker operation.

Miscellaneous equipment includes Hartzell three-blade, full-feathering propellers with spinners and anti-icing and wing de-icing systems.

Cruising speeds at various power settings are rated at 218 mph at 66-percent power using 300 hp per engine at 10,000 feet; 205 mph at 57-percent power using 260 hp per engine at 10,000 feet; and 199 mph at 53-percent power using 240 hp per engine at 10,000 feet.

This conversion can be applied to an owner's existing D-18 for about \$50,000. If complete overhaul is included, the price is approximately \$75,000. Pagan

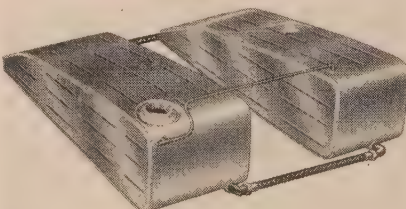
can also be purchased as a complete, fully-equipped aircraft for about \$95,000.



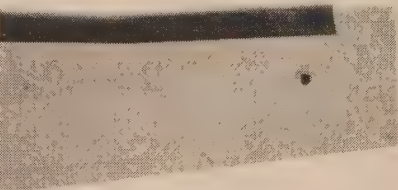
**THREE-BLADED**, light-weight Hartzel propellers, special part of "modernization."



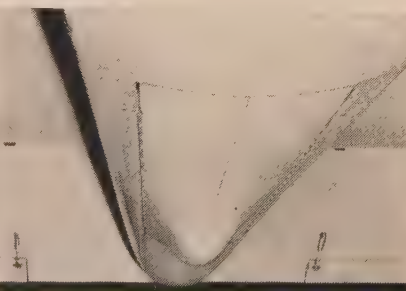
**ENLARGED INSTRUMENT PANEL** permits unitized lay-out of radio, other instruments.



**SPECIALLY DESIGNED TANKS** installed through underside stress plate openings in wings.



**MODERN WING TIPS** reduce wing loading, in-flight drag. Improve lateral stability.



**STREAMLINED TAIL GEAR DOOR** reduces in-flight drag, increases miles per hour.

## Greenhouse Patter

By "Torch" Lewis

TETERBORO: Now I've seen everything dept.: Sitting here with the rest of the lounge lizards when a 440 Convair landed not only painted but also striped, and I mean striped from stern to by gawd stern, and 360-degrees around. As we stood there gawking, the door slid open and out popped Bill Carrier who knows most all of what there is to know concerning the "chauffering" of Convairs because he is employed by Convair itself. Bill said that when he first taxied this striped bird around the DCA aerodrome the ground control frequency suddenly became jammed with whistles, hoots, catcalls and such garbage until finally some yokel really pulled the pug by saying "Whose Convair is it, Liberace's?"

Talking with one of the Learstar drivers from Detroit Junction who asked us to take an editorial poke at the pressurized airline airplanes who gobble up all the available lower altitudes particularly between CLE-PIT-EWR. He states that he has on several occasions been forced to climb to 13,000 to cross PIT whilst pressurized aircraft occupied the lower berths.

Personally, we are in agreement. However, a headwind is a headwind, and those Airline boys are just as fuel conscious as the Business boys. Maybe more so.

And whilst we are on the subject of dirty linen, leave us examine the IFR picture in the N.Y. Area. Since the Airline pilots decided to file IFR above 9,000 at all times when operating in the "Golden Triangle" (CHI-BOS-DCA) the work load of the New York Center has increased by 45 percent. Have "near misses" diminished by a like percent? Not on your life. All that's happening is that the understaffed, underpaid and overworked controllers are gasping on the ropes even on CAVU days, thereby lowering general operating efficiency.

The other day, for instance, we were in the squirrel cage over Greenwood at 4,000 when along comes an Allegheny Dizzy Three also cleared at 4,000 in the SAME holding pattern. Fortunately conditions were semi-VFR, so we avoided each other like poison until ATC took apoplectic corrective measures. But it still seems to us as though the best way to keep from being pranged (under IFR) is to have sharp, efficient controllers. And how can a guy be sharp when he is OVERWORKED? The best way to avoid mid-air collision, next to not flying at all, is to put the head on a swivel.

WILBROD SEZ: Why with all the beautiful, mellifluous ladies names in this world did they name that Victor Airways intersection in north Florida "Homo?"

CHIP SHOTS: Frank LaVigna of A Godfrey Productions sweating out a new F-27; likewise, Steve Brown of Continental Can.



By Russ Brinkley, Pres.

#### Editor's Note

Will all OX-5 pilots please send in their addresses and reports on their activities in order that Russ Brinkley may have this information for members who are asking about them. Mail to Box 1228, Harrisburg, Pennsylvania. Let's all try to help Russ. He is a wonderful guy.

Day after day we receive inquiries as to the present addresses and occupations of former OX-5 pilots and, strange as it may appear, a great percentage of the pioneers are still associated with the phase of aviation. Through close contact with more than 4,500 members, we are enabled to keep friends advised to the activities of all.

From reports on some of the more prominent OX-5ers, we learn that **Frederic Chamberlin** combines a real estate and aviation service at Shelton, Conn. **George Haldeman** gets his mail from National Airlines at Miami. **Ruth Nichols** is still engaged in aviation activities around New York City. **Viola Gentry** occasionally trades one hotel job for another. **Charlie Myers** grows citrus fruit near Miami. **Basil Rowe** spends much of his book "Under My Wings" on new tennis rackets. **Jimmie Gernert** sells air navigation equipment and consulting service from his swimming pool at Burbank. **T. B. Herndon** is Louisiana Aeronautics Department and **Asa Rountree** does likewise in Alabama. **A. B. McMullen** is Executive Secretary of State Aviation Office group. **Roscoe Turner** maintains general aviation sales and service at Annapolis. **Blanche Noyes** keeps on setting air markers for CAA and **Jack Harris** draws his pay from same reputable organization. **Roger Don Rae** is top TWA pilot at Chicago. **Edward Curtis** is Kodak Vice President. **Her Q. Williams** offers specialized aviation service from San Francisco. **D. Dockery**, former stunter, has flying unit in Arkansas. **Vince Barnett** is movie roles and runs a steakhouse in Santa Monica. **Tony Levier** is still working for Lockheed with **Fish Salmon**. **P. Jeppesen** puts out the famous aids from Denver. **Claire Chen** runs China airline. **Bill Ong** is in real estate up to his chin in Kansas. **Noel Wien** heads airline bearing his name in Alaska. **Brian Daville** imports choice wines and liquors at Mon-

treau. **Jack Frye** keeps abreast of aviation at Taos, N.M. **Roy Knabenschue** is retired in California and **William P. McCracken** can be located in the National Press Building at Washington. **Cammy Vinet** is promoting new type runway wind-direction fence and **A. B. Chalk** still offers air service from Florida to the islands. **Len Povey** is with Mackey Airlines and **Gen. Ralph Royce** is retired at Coral Gables. **Bevo Howard** runs AF training schools and still performs at air shows. **Marcellus Murdock** is publisher of the Wichita Eagle and **Sam Sague** owns Station WSRS at Cleveland. **Billy Parker** heads aviation division at Phillips Petroleum, and **Bob Oertel** is on equal footing with Esso.

**Merrill K. Riddick** is prospecting in Montana and **Frank Pappy Ryan** is an Allegheny Captain. **Dick Bensen** flies for **John Foster Dulles** and **John Knox** sells gelatin dessert by the carload. **Otto Enderton** is with CAA at Rochester, N.Y., and **Russ Holderman** flies there for the Gannett newspapers. **Bill Cramer** is with ATC at Idlewild and racer **John Livingston** is in dairy business in Iowa. Painter **Charles Hubbel** turns out Thompson calendars at Cleveland. **Marvin Staddon** flies for **L. B. Smith** and **Jack Bartow** has electronics business at Wings Field. **Al Litzenberger** is Mesta Machine pilot and **Hubert Stark** heads West Virginia aeronautics commission.



## BONANZA with TACTAIR AUTOPILOT

Selected by Beech as Optional Equipment

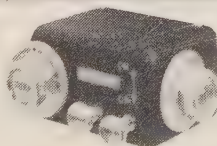
There's a new thrill in flying when you switch on the Tactair Autopilot in the Beech Bonanza. Smoothly, effortlessly, the Tactair's pneumatic system holds you straight, precisely on course or makes perfect turns.

And there's new ease in flying the Bonanza cross-country, thanks to the Tactair's amazing heading lock which makes flying VOR, ADF, or ILS localizer a cinch.

New 1958 Bonanzas can be ordered with the Tactair installed at the factory, to bring you this ultimate perfection in flying ease and safety. If you already own a Bonanza (Model A on) the Tactair can easily be installed in the field.

There's no finer tribute to the Tactair's proven reliability and performance than Beech's choice of Tactair—first autopilot ever selected by Beech for the Bonanza as factory-installed equipment.

### A FAR SUPERIOR AUTOPILOT SYSTEM



The Tactair T-3 operates pneumatically with no warm-up, no power drain, no tubes—so mechanically simple, yet so "human," that it makes any other flight system obsolete. Weighs only 7.3 pounds, simple to install, virtually maintenance-free.

#### WITH TRUE-READING HEADING LOCK

Tactair's heading lock works on the DG with no confusing zero heading. Merely set the upper card to course desired and you fly that course precisely. No complicated resetting for new course necessary.

#### AND NOW AVAILABLE - ALTITUDE CONTROL

Send for new brochure describing the Tactair T-3 Autopilot and this latest optional addition.

**TACTAIR**<sup>®</sup>  
INCORPORATED  
AUTOPILOT DIVISION

AIRCRAFT PRODUCTS CO.  
BRIDGEPORT, PENNSYLVANIA

For 18 Years Specialists in Precision Aircraft Pneumatic and Hydraulic Controls

# Accident Report

## Columbia-Geneva Steel Company, Lockheed Lodestar, N 1245V, Near Tyrone, Pa., December 20, 1956

A Lockheed Lodestar, model 18-56, N 1245V, owned by United States Steel Corp. and operated by its subsidiary, Columbia-Geneva Steel Co. crashed approximately five miles north of Tyrone, Pa., about 1923 on Dec. 20, 1956. The captain, co-pilot and a company official, the only persons aboard, were killed and the aircraft was destroyed.

### History of the Flight

N 1245V departed Greater Pittsburgh Airport, Pittsburgh, Pa. at 1850, Dec. 20, 1956, on an IFR flight plan via airways V-35, V-6, V-168, V-30 and V-1 to New York International Airport, Jamaica, N. Y. The crew consisted of Capt. Roy H. Rollo and Co-pilot Lewis Thomas Williams. Alden Roach, president, Columbia-Geneva Steel Co., was the only passenger.

At the time of takeoff from Pittsburgh, the gross weight of the aircraft was 19,421 pounds (maximum allowable gross load 19,500 pounds) and the weight was properly distributed. The purpose of the flight was to transport Roach to New York International Airport. The flight reported to Pittsburgh Air Route Traffic Center at 1905 when it was over New Alexandria, Pa., altitude 7,000 feet. A revised routing clearance to New York International Airport was issued to the flight at 1906 by ARTC to proceed via airways V-35, V-6, V-168 and Blue 18, and to climb to and maintain 9,000 feet. Accordingly, N 1245V reported leaving 7,000 and 8,000 feet at 1907 and 1909.

At 1921 the CAA Communications Station at Philipsburg, Pa., received a

call from the flight giving its position as over the Coalport intersection at 1916, estimating Philipsburg at 1930. Philipsburg radio then requested N 1245V to change over to the frequency of the New York Air Route Traffic Control Center and this message was acknowledged. This was the last radio contact with the flight.

At 1928 Philipsburg radio received a telephone call, from a location 24 miles east of the Coalport intersection and approximately 12 miles south-southwest of the Philipsburg Airport, to the effect that an aircraft, later identified as N 1245V, had crashed and was burning in a nearby mountainous wooded area.

The Philipsburg 1928 weather sequence was: Ceiling measured 400 feet, overcast; visibility 2 miles; fog; temperature 40; dewpoint 40; wind calm; altimeter 30.04.

### Investigation

The place of ground impact was in heavily wooded, rugged terrain, at an elevation of about 1,500 feet. The impact heading of the main wreckage was southwesterly, nearly a reciprocal of the destination heading. Numerous parts of the aircraft had separated in flight and these were found scattered for almost a mile in an easterly direction back along the flight path.

Impact forces caused deformation and binding of the de-icer distributor valve motor; however, it was found to be in good condition electrically and therefore is believed to have been capable of operation before impact. Except for the damage sustained during the accident, the wing and empennage leading edge de-icing boots were in good condition.

Both propellers were equipped with

alcohol de-icing equipment. The positions of the propeller domes were: Left, 45 degrees; right, 61 degrees. All stops were properly positioned. Study of the shim plate markings indicated that the propeller blade angles at impact were: Left propeller, 33 to 52 degrees; right propeller, 48 to 54 degrees. A complete examination of both engines disclosed no evidence of a failure of any of the essential components of the power plants while in flight. It was observed that there was a notable absence of deposits in the combustion chambers of both engines. Both heat and alcohol were available as anti-icing measures to cope with carburetor and/or induction icing. Top deck screens were installed on both carburetors.

The aircraft was equipped with a dual set of instruments which included sensitive altimeters, airspeed, turn-and-bank, rate of climb and artificial horizon indicators. Besides these instruments there were a magnetic compass, directional gyro, Collins Integrated Flight System and two automatic direction finders.

Examination of the entire wreckage disclosed no evidence of fatigue failure nor was there any evidence to indicate that a foreign object struck the aircraft in flight. All parts of the aircraft were accounted for within the wreckage distribution area. The initial airframe failures were all the result of loads in excess of the design strength of the particular parts or components. There was no evidence which indicated that a fire or explosion occurred during flight.

An examination of the aircraft logs, books and maintenance records disclosed no pertinent discrepancies.

On the afternoon of Dec. 20, 1956,

## Lycoming Opens New Engine Service School At Williamsport Airport



Establishment of a modern aircraft engine service center and training school at Williamsport, Pa., Airport is announced by Lycoming Div., Avco Manufacturing Corp.

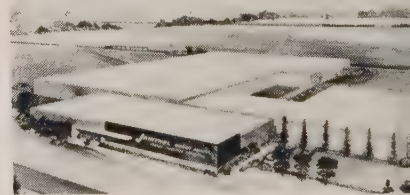
Modern classroom facilities in the recently erected Service Administration Building provide school for customer mechanics who maintain and service Lycoming engines.

School provides free week-long training plus observation of actual maintenance procedures at the adjacent Service Hangar.

Service Center meets variety of needs in expanding business aircraft field. Students are instructed, for instance, that modification of fire-wall on the Aero Commander requires removal of the engine, but the propeller and related parts need not be removed from the engine. Instruction on servicing and giving maintenance to Lycoming helicopter engines is offered by the school, also. Joseph Diblin is director of the center and Ralph M. Persun Jr., Lycoming service representative, will conduct the mechanics school.

## Janitrol Aircraft Division Building Multi-Million Dollar Plant

Construction is underway on the new Janitrol Aircraft Division manufacturing, engineering, research and testing and office buildings at Columbus, Ohio. Robin A. Bell, vice-president, Surface Combustion Corp. and general manager, Janitrol divisions, announced.



Completion of the 130,000-square-foot plant is anticipated by early spring. The high-altitude test facility and new buildings will cost nearly \$2,000,000.

Janitrol Aircraft Div. designs, develops and manufactures specialized components for aircraft and missiles.

overcast existed over the entire state of Pennsylvania, with ceilings ranging from zero to about 1,500 feet in the southwestern portion with tops at approximately 11,000 to 12,000 feet. Fog and occasional light rain was occurring. At the time of the flight's departure the freezing level was about 9,000 feet at Pittsburgh and lowering to the east to near 9,000 feet in the Tyrone area. Forecasts available before departure of N 1245V indicated light to moderate rime icing above the freezing level, with the freezing level forecast to be 9,000 feet in western Pennsylvania sloping downward to about 6,000 feet in western New York. Meteorological conditions were conducive to the formation of carburetor or induction system icing.

There were several flights through the Philipsburg area at the approximate time of the accident. They reported no icing or turbulence; however, their flight altitudes were below the 9,000-foot level of the Lockheed. Two of these flights mentioned a broken cloud condition a few miles west of Philipsburg.

#### Analysis

Because of the lack of certain tangible evidence much is unknown. It is known that the pilot was flying under VFR conditions and was assigned an altitude of 9,000 feet; also that his last position report was made at 1921, five minutes after reaching Coalport. Since his report was made in a normal tone of voice and since nothing was said to the contrary, it can be reasoned that an emergency situation was not recognized at that time. However, approximately two minutes after that report was made the aircraft struck the ground. Therefore, whatever happened did so quickly and shortly after the last report was made.

Ground elevation at the scene of the accident is 1,500 feet and this altitude, considered in relation to the assigned altitude of the aircraft, means that the aircraft descended 7,500 feet, at an average rate of descent of about 3,750 feet per minute. Although the exact pattern of the descent is not known, it is believed that the speed of the airplane during the descent, coupled with maneuvering loads, created forces beyond the design strength of the aircraft. This is undoubtedly true since evidence was found to indicate any error or failure or defect of any of the components of the aircraft.

#### Probable Cause

The Board determines that the probable cause of the accident was the loss of control for reasons unknown resulting in a rapid descent during which structural failure occurred.

the Civil Aeronautics Board:

/s/ James R. Durfee

/s/ Chan Gurney

/s/ Harmar D. Denny

/s/ Louis J. Hector

Reported: Nov. 5, 1957

#### SUPPLEMENTAL DATA

##### Flight Personnel

Capt. Roy H. Rollo, age 43, held a currently effective airman certificate

with an airline transport rating and type ratings on Lockheed PV-1 and L-18. He was employed by an associate company on January 1, 1945, as a pilot, and was transferred to Columbia-Geneva Steel Co. on Aug. 21, 1951, as chief pilot. Captain Rollo had flown a total of 10,615 hours, of which 498 were in the Lockheed Lodestar. His last instrument flight check was passed satisfactorily on Nov. 1, 1956. The date of his last physical (no waivers) was June 5, 1956. His flying time in the 30 days prior to Dec. 20, 1956, was 22 hours, 50 minutes.

Pilot Lewis Thomas Williams, age 47, held a currently effective airman certificate with ratings of commercial pilot, single- and multi-engine land and DC-3 and Lockheed 18 type ratings. He was employed by Columbia-Geneva Steel Co. as a co-pilot-mechanic on Dec. 3, 1954. His total flying time was 2,315 hours, of which 424 hours were in the type aircraft involved. His last physical examination was passed on June 30, 1956.

#### The Aircraft

Lockheed Lodestar N 1245V, model 18-56, serial number 2470, was manufactured June 16, 1943. It was purchased from the Brown Paper Mill Co., Inc., Monroe, La., in 1954. Total airframe time was 3,715 hours, with 2,525 hours since major overhaul and 30 minutes since last line inspection. The aircraft was equipped with two Wright Aeronautical Corp., model R-1820-56 engines, and two Hamilton Standard model 33D50-135 propellers. Time on both engines since last overhaul was 420 hours with the same amount of time on both propellers since overhaul.

#### Aircraft Production

(Continued from page 21)

magazine Flight states, "supporting the pilots and operators of these machines is a network of distributors and maintenance companies who are helping to build up an industry that is expanding in parallel with the growth of air transport." The article observes that the development of the European common market, which will remove customs barriers over much of Western Europe, will open the way for a major expansion in private air transport.

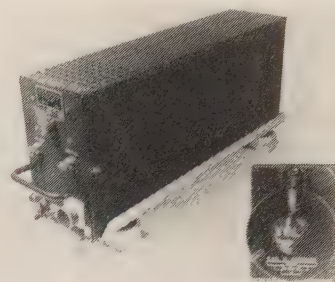
The various observations drawn from various sources all point to a good production and marketing outlook for general aviation, both today and looking well into the future.

However, two problems remain unsolved and can be very detrimental to the continuing growth of general aviation. They are airways modernization and adequate airports. Fortunately, there seems to be a national awareness on the part of our governmental leaders that the growth which is occurring is becoming ever more potent and important.

To close, I borrow from one of my manufacturing friends. Regarding our industry and its prospects, he said, "I think it's early in the morning, and the sun is shining!"



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#### Air Your Views

(Continued from page 6)

sea and land reservations for other branches of our military service in order to provide adequate training and testing space for our present huge military establishment. A further study of the New York-Washington A.F. charts discloses an interesting situation: There is only one Air Force restricted area in direct line between these two cities and that encroaches exactly 3.5 miles, making an increase in length of flight between New York and Washington, according to my slide-rule of 0.75 percent. Is it possible that the plane which flew this route and found it 28 percent longer than is necessary in order to accommodate the Military, may have deviated a trifle from true course searching for Military encroachments, or just plain (plane) got lost?

Colonel (ret.), U.S.A., Piedmont, Calif.

# RADAN, New Doppler Navigation Aid

By Gordon Edwards

"If it works, it's obsolete!" This little motto so often applied to the science of weapons has its civilian counterpart in the state of air navigation developments. The VORTAC decision of 1956 seems to have been a beginning rather than an end to controversy. On the one hand, the U.S. continues plans to implement TACAN while the other nations through ICAO and NATO reject any such modification of the original VOR "Common System." Meanwhile, the British seize the opportunity to push their Decca low frequency "Area Coverage" system, so ably proven in ten years of wide service outside of the U.S. Omega, Radio Web, Cytac and other systems clamor for adoption.

There is no doubt that we are going to need the best possible ground-based air navigation system for the foreseeable future. But whether that system be an improved VOR, or Decca, or whatever, the Doppler systems offer an unique economic and technical freedom

from obsolescence, ground maintenance and site-ing problems.

SKYWAYS flew such a system recently. General Precision Laboratories (GPL), Pleasantville, N. Y., calls it RADAN. The science of air navigation by looking at and recognizing known landmarks is called pilotage. In areas, or in flight conditions where landmarks are not available or visible, the art of "dead reckoning" became the pilot's mainstay until a system of ground-based radio aids was developed. The pilot learned to compute a "probable" track over the ground from forecasted or observed movements of the air ocean in which he was flying added to known facts of his heading and rate of movement within that air ocean. That such computations were more often wrong than right is proven by the rapidity with which ground-based navigational aids were developed and relied upon.

A price had to be paid for this development. That price was the loss of his true "freedom of the air." Under

too many conditions of weather or geography he could move about only as the availability and reliability of these ground aids permitted. The pitiable state of this enslavement is graphically described in the fine but voluminous print of the Airmen's Guide (NOTAMS) and the scrap paper-like re-issues of flight navigation charts.

Radan requires only one assumption of basic information, that you know where you are when you start out. On that basis, you can navigate to any point on the face of the earth, in any weather, free of any ground-based aids but with comparable accuracy. The manner in which the necessary information is obtained is best explained as follows.

If a wave propagating source moves toward an object, the frequency of the waves observed by the object is higher than the actual propagating frequency. The increase in frequency (or decrease, if the source is moving away) is a result of, and is proportional to the speed. This frequency variation is called the Doppler shift.

Thus, a person standing on a railroad platform listening to the whistle of an oncoming train hears the pitch of the whistle drop as the train passes him. As the train approached, the observer heard the whistle frequency plus a Doppler shift due to the motion; when the train passed, he heard the whistle frequency minus a Doppler shift.

In a Radan-equipped airplane, a compact Antenna-Receiver-Transmitter (A-R-T) transmits four beams of pulsed microwave energy, two at a time in diagonal pairs, (left-front, right-rear; then right-front, left-rear) toward the earth by means of a specially designed slotted planar array antenna. Echoes of these signals are back-scattered to the airplane, Doppler shifted in frequency by an amount proportional to the aircraft's speed over the ground. Between transmitted pulses, the receiver "listens" for the echoes.

Two kinds of echo comparisons are made continuously in the equipment. First, the total Doppler shift of one of the diagonal pairs is compared with the total Doppler shift of the other pair. If there is no difference in total Doppler shifts, it means that the four beams are symmetrically aligned about the line of the plane's actual flight over the ground—and that the center line of the antenna is pointing, therefore, along the plane's ground track.

If, however, a difference between total Doppler shifts of the two diagonal pairs does exist, this difference is detected in a unit of the system called the Frequency Tracker. The difference is used to generate an error voltage which actuates an antenna servo-mech-



**DOTTED LINES** represent requested deviations from GPL flight plan which were accurately plotted by RADAN computer. True or magnetic track information can be inserted according to need or pilot preference, based on source of information.

ism. The servo physically rotates the antenna in a horizontal plane until the difference is eliminated, the error voltage is null, and the antenna is again aligned with the ground track.

The angular displacement of the antenna from the longitudinal axis of the aircraft—the drift angle—is transmitted by the A-R-T to an Indicator where it is displayed continuously before the pilot or navigator.

The Doppler shifted echoes are used in a different way for the determination of ground speed. Because the front beam frequency is shifted upward, and the back beam frequency shifted downward, mixing the two yields a beat frequency—the total Doppler shift—which is directly proportional to the speed of the plane. Measurement of this total Doppler shift in the Frequency Tracker in cycles per second, and providing this measurement as an output to the Indicator suitably calibrated in knots, gives the pilot a continuous display of his ground speed.

Depending upon the application and the desired accuracy of the total system, this Doppler derived ground speed and drift angle may be fed to a variety of computers which, in turn, can display for the pilot, such information as present position, distance to destination, course to destination, and distance flown.

SKYWAYS enjoyed the unexpected privilege of witnessing the first actual check-out flight of just such a GPL-designed computer-indicator to accompany the basic Radan equipment in business and other commercial aircraft. The results transformed a routine demonstration of the well established Drift Angle-Ground Speed capabilities of Doppler systems in general into a dramatic revelation of the immediate practical application of the GPL version to modern, everyday all-weather flying on or off the beaten paths of the present airway systems.

When we boarded the GPL Mohawk lines (leased) DC-3 at Westchester County Airport, we were determined to take full advantage of the offer made by GPL's Ray Chatman, commercial sales manager, to introduce any variations into the pre-set demonstration routine to clearly establish to our own minds the capabilities of both the basic plan (on which they hung their accuracy claim of a total allowable error less than 1%) and their untried civil market computer (of which they were more sure than we).

We carefully noted their statement that the usual procedure was to attain approximately 200 feet altitude; pre-set the drift angle switch to the anticipated drift angle and ground speed which to about 100 knots and then engage the Radan. So we perversely tested that both be zeroed and ended before actual takeoff run on the aligned crosswind runway, simulating as closely as possible an actual instrument departure. After a little dubious shaking, it was agreed and off we

once this was to be a combination

test/demonstration of the computer/indicator system as well, the magnetic track from the airport to the first fix, the Stewart AFB tower (not just the airport, mind you!) and the carefully plotted mileage (to the tenth) was set into the Radan. Just before we broke ground the Ground Speed indicator came alive, hunted momentarily and then settled fairly steadily to a quite believable indication of our rapidly accelerating speed, confirmed by a quick rough mental computation employing the tower-reported wind velocity and indicated airspeed. Within seconds of breaking ground, as the pilot compensated for the cross wind to hold the DC-3 along the runway center-line,

the Drift Angle indicator wavered momentarily and then faithfully aligned itself along the runway just before we cleared the boundary. As far as a "low limits" takeoff was concerned, we had emphatic assurance before entering "the base" that the system was functioning accurately.

Considering that the takeoff runway and immediate climb-out pattern was not coincident with the ideal direct track to the first fix, it was quite satisfying to note not only that the familiar cross-pointer vertical needle indicated an off-course deviation but that a counter-type odometer device advised exactly how many miles to right or left of

(Continued on page 41)

## New GLIDAIR Windshield Cleaner

...restores original clarity to plastic windows and windshields!



Poor visibility hampers safe operation. Now, you can overcome this handicap with new GLIDAIR Windshield Cleaner which restores visibility and flexibility to scuffed or cloudy plastic windows and windshields.

It's easy to use, too! Just rub it on, let dry and polish smooth with a clean, soft cloth. New GLIDAIR Cleaner actually renews the surface, removes mars, smudges, other damage. Even fine scratches disappear under frequent application, leaving a smooth, flexible surface that resists checking or cracking.

New GLIDAIR Windshield Cleaner is also ideal for plastic convertible windows, mirrors, other glass and plastic surfaces. It's available in handy 9 oz. unbreakable bottles from most private operators or write for the name of the nearest distributor.

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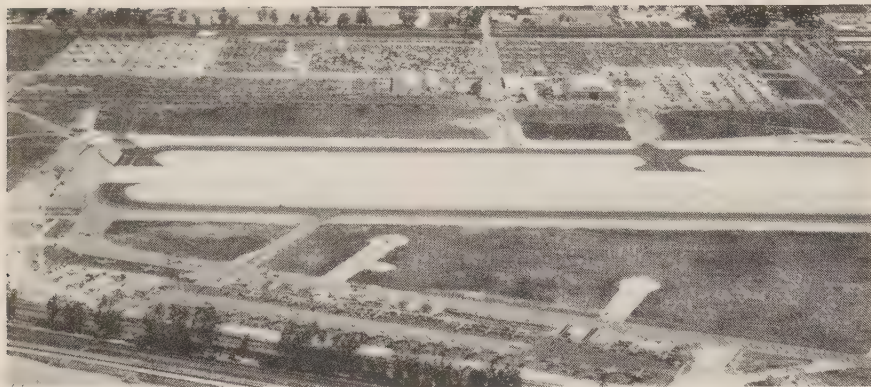
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# 10 years of SERVICE



**C**elebrating its tenth year of aircraft services is Southern California Aircraft Corp. (SCAC), Ontario, Calif. Being the extra genial host during its anniversary is part of SCAC's service.

All visiting pilots and flying executives are greeted at the runway by a small Microbus which leads the plane in and transports pilots, passengers and baggage to SCAC's lodge-type pilots' lounge.

Michael F. Reilly, company presi-

dent, has equipped the lounge building with telephones, wire facilities, showers, refreshments, library and even secretarial services. A hostess helps with reservations for hotels, night clubs, shows and other events of interest in southern California and its desert, mountain and beach resorts.

Transportation arrangements are available to nearby downtown Los Angeles, scarcely an hour away by freeway. More and more pilots are using the airport in Ontario to avoid the

cross-town Los Angeles traffic, reports Reilly.

Personal service is a policy at SCAC whose engineers and technicians are long-experienced in repair and maintenance of aircraft. More than 50 acres of facilities are available for plane owners whose craft may need anything from a minor adjustment to a complete overhaul.

An exclusive feature at SCAC is the Plane Panel, which consists of department heads meeting daily to review the condition and progress of each plane on the base. This has resulted in accelerated plane care and top quality product. Assisting on the Panel are James L. Gechter, vice-president and general manager; and Frank M. Hayden, vice-president and secretary-treasurer of the firm.

Reputation of the company dates back to its early prominence in converting PBVs into luxurious flying yachts for prominent Americans and foreign governments. But, although SCAC still leads in PBV conversions, the bulk of its present day business is in the repair and maintenance of executive aircraft and reciprocating and jet engines.

Pilots and flying executives the world over can look to SCAC and southern California for top service and most comfortable and enjoyable surroundings, declares Reilly.

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## THE OHIO AVIATION CO.

Dayton Municipal Airport

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## Safety Digest

(Continued from page 26)

t which seriously restricts the intake any one of these essentials must be prescribed by a physician. For example, food faddist diets, such as "no fat" types, can lead to a grossly deficient nutritional balance, fatigability and lowered resistance to infection.

The problem of self-medication has reached such a magnitude in the USAF that the Surgeon General, in a letter to command surgeons, directed that the dangers of self-medication by flying personnel be emphasized and appropriate action be taken to inform all flying personnel of the dangers.

A close physician-patient relationship can solve many problems that may be provided the points discussed above are recognized. It is principally the responsibility of the individual to safeguard his own health and well-being by using sound judgment and adhering to proper treatment as prescribed by the flight surgeon.

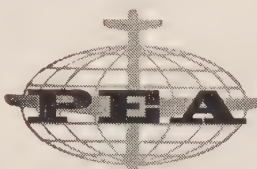
The ancient proverb "He who treats himself has a fool for a doctor" was never truer than for those who fly.—  
MBAT CREW

## YOUR AIRCRAFT IS ONLY AS GOOD AS ITS PILOT

80% of all corporate aircraft

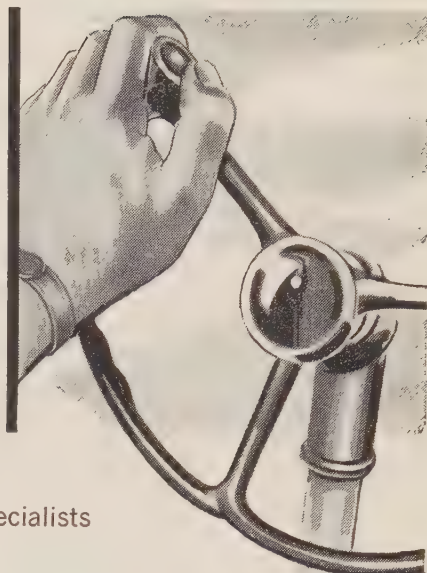
owners rely on PEA, specialists

in supplying skilled pilots.



## PILOTS EMPLOYMENT AGENCY

Teterboro Airport 1, New Jersey, ATlas 8-9474



## Awards Contracts

Standard Transformer Co., Warren, received \$411,716.16, largest single contract awarded by CAA of \$1,471,499 total during four-week period ending November 1. Contract is for transformer sub-stations.

Other contracts were to Radio Corp. America, New York, N.Y., \$245,25, for ten high frequency receiver sets; Collins Radio Co., Dallas, \$228,780.31, for 16 repeater stations; buildings for micro-wave links; Champion Blower and Forge Co., Lancaster, Pa., \$157,022, for 350 ventilators; National Engineering and Manufacturing Co., Sedalia, Mo., \$93,44, for 1,145 relay racks and spare parts; Maryland Electronics Manufacturing Corp., College Park, Md., \$68,01, for 614 antenna systems; 69 insulator kits; Aeronautical Communications Equipment Co., Miami, Fla., \$66,342.70, for transmitter component and spare parts.

Collins Radio Co., Dallas, Tex., \$22 for one micro-wave system, spare parts and test equipment; Peer Instrument Co., Elmhurst, N. Y., \$50, for 50 portable field detectors; spare parts; Topp Manufacturing Co., Los Angeles, Calif., \$39,238.80, for 4 carrier modulator sets, 64 carrier modulator drivers and spare parts; S-Clarke, Silver Springs, Md., \$39.82, for 58 audio oscillators and spare parts; Virginia Electronics, Arlington, D.C., \$18,605, for 64 ILS receivers and spare parts; Huber-Warner, Marion, O., \$12,681, for spare parts for a previously purchased radar and for shipment to Pakistan under international Cooperation Administration program; Bendix Radio, Towson, Md., \$12,149 for six interrogators and three indicators.

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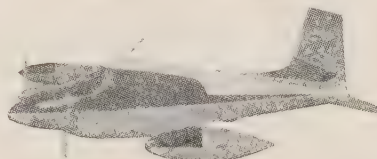
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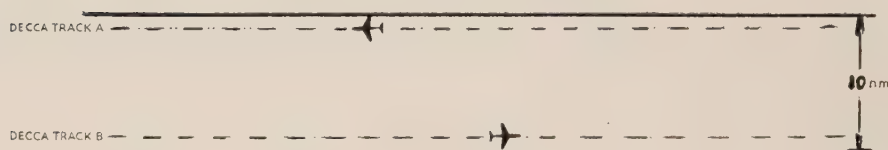
## Next Month Read—

### WEATHER PLANNING FOR PILOTS

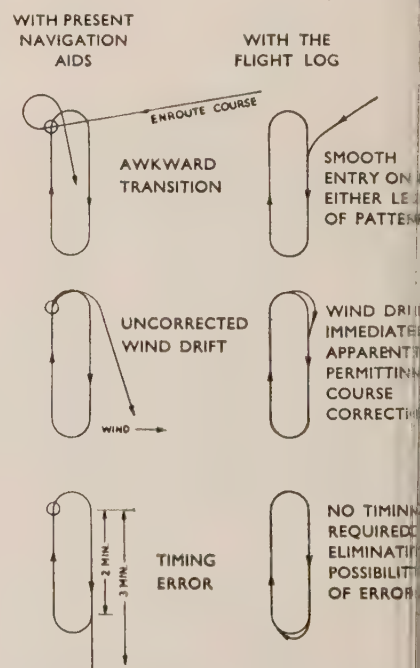
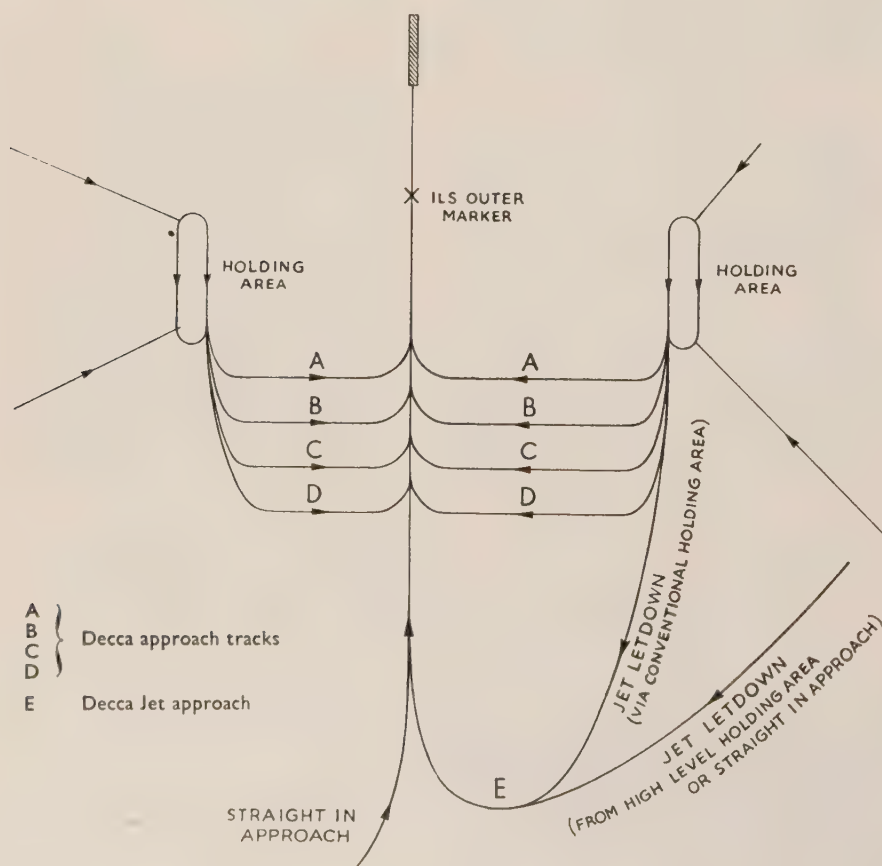
Round Table in two parts—February and March Issues

# Bendix-Decca ATC Procedure

*The following are a few examples of how Bendix-DECCA can facilitate ATC procedures and ease pilot workload.*



**DUAL TRACK AIRWAY**—Decca tracks located 1 nm. in from edge of airway results in 8 nm. lateral separation. This permits: (a) a fast aircraft to overtake and pass a slow one without altitude change (b) use of same altitude by two aircraft of same or opposite direction (c) unrestricted altitude changes irrespective of other enroute traffic (d) free descent of high altitude approach traffic through unpressurized enroute traffic (e) and a substantial reduction in longitudinal separation due to the continuous position in formation.



**HOLDING PATTERNS** shown above illustrate airspace areas for both holding and hold patterns. Not only can holding fixes be set up at any convenient point, but also they can be set up in crowded terminal areas where the required "buffer zone" of extra airspace around holding patterns would be minimized.

Special air traffic control procedures already set up and in operation at London, Copenhagen and Frankfurt airports for use by Decca-equipped aircraft.

**ARRIVAL PROCEDURES**—By use of appropriately inscribed approach charts, Decca would enable the pilot to accurately follow the desired assigned path that would properly space successive aircraft on final approach as now accomplished by radar vectoring.

## Radan

(Continued from page 37)

course rather than solely the angular displacement information of VOR/ILS. Meanwhile, a similar counter device reeled off the remaining and changing distance to our first fix.

It was interesting to note that although the moderate turbulence at lower levels produced some undamped oscillations in the GS indications, a quite easily read and credible set of data was always obtainable.

Because of local jet traffic at Stewart AFB, the pilot advised that he would have to pass abeam the airport rather than directly over the tower (GPL was not satisfied with customary pilot versions of "time over fix" reports and so they use a drift sight apparatus installed in the cabin to "Hairline" the chosen fix landmark!). Possibly overly wary from other past pre-set demonstration flights, we immediately suspected some skullduggery and were sure of it when the Stewart tower passed under the swept-back leading edge while the distance-to-destination indicator indicated almost a mile yet to go. Before I could make my doubts clear, however, the tumbler turned up zero and at Ray's relayed request to the cockpit, the pilot swung the DC-3 to the appropriate heading parallel to the pre-planned track and the control tower obediently rotated into proper place as exactly abeam the nose as could be observed from the air.

Taking advantage of the unwanted but enforced deviation, the pilot orbited in the vicinity of Stewart while the Radan competently performed rudimentary arithmetic displays of our displacement at any moment from the chosen fix point. Finally obtaining clearance to overhead the tower and pick up the track to our next fix, Newark Airport (again the tower to the tenth mile rather than the airport), Ray set into the Radan the exact course and mileage point-to-point and engaged the system as another engineer aboard drift-sighted the departure fix. We got the impression that being such "nuts" about accuracy was a normal way of life with these GPL people!

The worst we could think up en-route to Newark was to simulate one of the most exasperating flight path calculations any IFR pilot faces, a dual VOR holding pattern, such as LaGuardia's Sparkill. With the appropriate intersection information fed into the device, it is no trick at all to fly the prescribed reciprocal tracks any prescribed width and length of pattern. In fact with a visual plotter of the

(Continued on page 43)

## Business Aviation Grows

In 1946 business flying was credited with about 1,000,000 hours; in 1956, about 5,000,000 hours. It now represents about 50 percent of general aviation. In 1954, there were 18,600 privately owned-operated planes; by 1956, 23,000.

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Johnson Lumber & Regenold Construction  
St. Paul, Minn.

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# in the business hangar . . .

■ **EXECUTIVE AIRCRAFT SERVICE INC.**, Dallas, Tex., installed a Narco Omnigard and Lear ADF on Luscombe 8-F of William H. Messick.

**S. W. Richardson** had a 100-hour inspection given one of its DC-3s. Ed Armstrong is pilot.

**Gulf Oil Corp.**, Fort Worth, Tex., had a propeller overhaul and installation of new tires on a Lockheed Lodestar. Pilot is Stein Lee.

**Republic Natural Gas Co.'s** Lodestar was given a 100-hour inspection and was relicensed. Jim Westbrook is pilot.

**Union Producing Co.'s** Lodestar had installed an RCA Weather Radar, ARC ADF, Eclipse-Pioneer inverter, 200 amp generator system and new instrument panel. Chief Pilot is E. P. Jeter Jr.

**Tennessee Eastman Co.** had a new cockpit heater and defrost blower installed in its DC-3. Pilot is Leo Boyd.

**Dow Chemical Co.**, Midland, Mich., DC-3 repaired engine, plane and radar systems. Pilot is Russell Purchase.

■ **AERO ELECTRONICS INC.**, Sky Harbor, Phoenix, Ariz., installed on Utah Construction Co.'s Cessna 310 from Mexico City an ARC 15E Omni, ARC R20 Marker, ARC CDI Course Director, ARC T20 transmitter and Transval Mark IV MHF transceiver.

**Motorola Research's** Twin-Bonanza had an ARC 15E Omni and R89B Glidepath installed. Pilot is James Parkhill.

**Martindale Book Store**, had installed in their Bonanza a Narco Mark II Omnigard and Lear ADF12E.

**Traders Furniture Store's** Apache had a Lear L-2 Autopilot and Altitude Control installed. Pilot is Bill Bennett.

**C. L. Stephens'** Navion was equipped with a Mark II Omnigard.

**Ben Hazelton's** Apache had installed an ARC 15E Omni, ARC R20 Marker, Flitelectronics CA2 Distribution Amplifier and Wright Remote 90 Transceiver.

■ **QUALITRON INC.**, Lockheed Air Terminal, Burbank, Calif., delivered Home Oil Co.'s Lodestar after installing complete radio system including dual ARC ADF system, dual Bendix Omni system, Bendix VHF communication and glideslope system, Transval HF system, inverter system and custom-built edge lighted panels. Donald Douglas is chief pilot. Home base, Calgary, Canada.

**Signal Oil and Gas Co.'s** DC-3 is now equipped with RCA AVQ-50 Weather Radar system. Orlin Sorenson is Chief Pilot and NBAA representative.

**Triplett and Barton's** C-50 Twin-Bonanza was delivered after installation of a DARE DTR-360 Transceiver, ARC T-21 transmitter, dual ARC VHF navigation system with CD-1 Course Director, ARC Marker Beacon and ADF systems, Flitelectronics audio amplifier system and a Wilcox glideslope receiver system. Tom Triplett is company pilot.

**Mark Hurd Aerial Surveys Co.** has taken delivery of two P-38 camera planes after installation of HF communications

and ADF systems.

**Westinghouse Electric Corp.'s** B-23 had a Bendix Weather Radar System, Dual ARC ADF system and new inverters installed. A. C. (Curly) Korb, chief pilot.

**Sunray Mid-Continent Oil Co.'s** Lodestar received radio service. Herman Arnspiger is company pilot.

**Union Oil Co.**, Burbank, Calif., has installed in their new Convair 440 a Bendix Weather radar system, Sperry Autopilot and Engine Analyzer systems. Jim Stevenson is chief pilot.

■ **AERO TRADES INC.**, MacArthur Airport, Ronkonkoma, Long Island, N.Y., made annual inspection of Boris Sergievsky's Grumman Mallard.

**Joseph James Ryan's** Grumman Mallard received a double engine change, repainting and modernization of electronics installation. Charles W. Bing is chief pilot.

**Swiftlite Aircraft Corp.'s** Lockheed Lodestar had installed a new heater for cockpit area and windshield defrosting. Chief pilot is Jim Rogers.

**Lyon, Inc.'s** Grumman Mallard received a 100-hour inspection. Elmourza Natirboff is chief pilot.

**Curtiss-Wright Corp.'s** DC-3 received a 100-hour inspection and routine maintenance.

**Columbia Gas System Service, Inc.'s** Lockheed Lodestar received new de-icer boots. Pilot is Arthur Stewart.

**Gillette Co.'s** Lockheed Lodestar had installed overhauled landing gear assemblies.

**Fuller Brush Co.'s** Grumman Mallard was given a major inspection and landing gear and hydraulic overhaul, plus an exterior repaint.

**Gulf Oil Corp.'s** DC-3 had the cabin interior furniture and bar compartment reworked. Walter Kupchak is pilot.

**General Motors Corp.'s** Grumman Mallard was given a 100-hour inspection.

■ **POTTER AIRCRAFT SERVICE, INC.**, Lockheed Air Terminal, Burbank, Calif., completed 100-hour inspection, double engine change and installation of CAIR radome on Signal Oil and Gas DC-3. Chief pilot is Orlin Sorenson; co-pilot, Ray Nielson.

**Pacific Lumber Co.'s** DC-3, piloted by Wes Stetson, was in for a 1,000-hour inspection, gear and prop overhaul and engine change.

**Potlatch Forest's** Lodestar returned to service after propeller overhaul, de-icer boot installation and minor modifications.

**Union Oil Co.'s** DC-3 was in for an "ATS wet wing" installation, new instrument panel, radome installation and other major modifications.

■ **VAN'S AIR SERVICE, INC.**, Winona, Minn., completed a 100-hour inspection on Johnson Air Interests, Inc.'s 680 Aero Commander. Pilot is Les Johnson.

**Giddings-Lewis Machine Tool Co.'s** Lockheed Lodestar received radio and miscellaneous maintenance. Doug Lionberger is chief pilot.

**J. R. Watkins Co.'s** Cessna 310 had a

100-hour inspection, beacon installation and radio work. Their DC-3 had a double beacon installation and radio work. Jack Ollom is chief pilot.

**Jack Kelley's** Temco Riley received a 100-hour inspection and miscellaneous work.

**J. R. McCabe's** Navion had an engine major and 100-hour inspection.

**Dr. Lloyd Whitesell's** Navion had an engine major and radio installation of a Narco 1060.

**Pixler Electric Co.'s** Navion had a 100-hour inspection and miscellaneous work.

**Richardson Scale Co.'s** Bonanza had a 100-hour inspection.

**Midest Preload Construction Co.'s** Cessna 182 had a 100-hour inspection and radio installation.

■ **PIEDMONT AVIATION, INC.**, Winston-Salem, N.C., completed 100-hour inspection on Apache owned by Shen-Virginia Lee Corp., flown by Curtis Turner.

**Krispy Kreme Doughnut Co.** had 100-hour inspection on their E18S. Pilot is Rex Beamer.

**Olin Mathieson Chemical Corp.'s** E18S, flown by M. J. Davern, had 50-hour check and miscellaneous repairs.

**Pocahontas Fuel Co.'s** D18S was given a 100-hour inspection. Pilot is Bob Amundsen.

**McLean Trucking Co.** had 50-hour inspection on E18S flown by Roy Wakefield.

**R. J. Reynolds Tobacco Co.'s** chief pilot Herb Drew flew in the company's E18S for a 100-hour inspection.

**Slane Hosiery Mills** had a 100-hour inspection on their AT-11. Pilot is Willis Slane.

■ **REMMERT-WERNER, INC.**, Lambert Field, St. Louis, Mo., made a double engine change and oxygen system modification to the Trostel Leather Co.'s Super Beechcraft. Pilot is Rick Ravitts.

■ **SPARTAN AIRCRAFT CO.**, Tulsa, Okla., completed a 100-hour inspection of Transcontinental Gas Pipe Line Corp.'s Lockheed Ventura which was flown to Tulsa from Houston, Tex., by Bob Harlow and Stanley Rader.

**Kewanee Oil Co.'s** DC-3, piloted by Frank Avernig, was in for a 100-hour inspection and radio repairs.

**Champion Paper and Fibre Co.'s** Lockheed Ventura was flown in by Charles Hayes for engine change and miscellaneous aircraft and instrument repairs.

**Ashland Oil and Refining Co.'s** Lockheed Lodestar had an electric elevator trim installed plus overhaul of engine instruments and accessories, overhaul of one propeller and miscellaneous work.

**Tulsa Tribune's** Navion received a 100-hour inspection.

**Mechanical Products Co.'s** Lockheed Ventura, piloted by A. D. Knapp, was in for miscellaneous aircraft and engine work.

**Tidewater Oil Co.'s** Lodestar received a 100-hour inspection. Pilot is Al Scarlata.

**Shell Pipe Line Co.'s** DeHavilland Dove had its annual periodic inspection of aircraft and instruments.

## RADAN

(Continued from page 41)

types currently offered with the new LF systems, it is probable that the resultant hold would resemble most the chart-drawn pattern, as contrasted with current weird results monitored by airport surveillance radars.

The "landfall" over Newark's tower was exceedingly accurate as observed thru the drift sight, and with the computer reset we wheeled around and headed out for Westchester, the last and final fix of the demonstration.

Being constitutionally "hard-nosed," it was only natural with us to again try to waylay the best laid plans of mice, men and GPL representatives. We demanded that the theoretical "check hood" remain in place and a full transition and low IFR approach be made even as we have struggled through it so many times.

By this time more confident with their fledgling computer gadget, Ray and the flight scheduling department rearranged some plans for the afternoon and a course was set for Wilton omni while coordination was effected with the Westchester tower and the company.

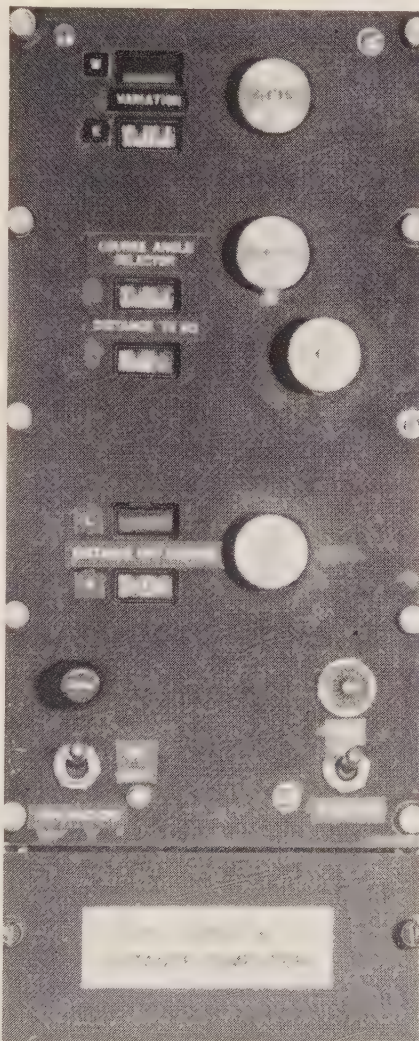
This flight plan change to "alternate" required some quick straight-edge and map maneuvering by an engineer in the back, to come up with the required figures which in practice would be taken off regular IFR approach plates. Nevertheless, the transition from Wilton to the ILS outer marker was accurate, again to interpolated tenths of a mile. Ray agreed that an enlarged version of the odometer showing tenths was a necessity to enjoy the accuracy built into the equipment.)

Here our only dissatisfaction with the equipment cropped up. It took about 25 seconds of fumbling for the engineer (we were sure any pilot with practice could do it under five) to set into the Radan computer the exact bearing and distance to the runway. As a result when the pilot completed procedure turn and came inbound on final over the marker, there was an off-side error equal to the delay distance inherent in the change over! A dualization here of the course and distance data is in the works to permit pre-setting the next leg! (It must be kept in mind that the entire flight from takeoff to landing was being guided by data set into the computer by the engineers in the cabin working off charts, and existent radio aids information referred to only occasionally for comparison!)

We negated the pilot's query as to whether we wanted him to fly his ILS indicator rather than the Radan cross pointer and the flight stubbornly proceeded unerringly down the side of the familiar localizer path to the middle marker at which point missed approach procedures were instituted although it was obvious that a gentle correction could have effected a landing if this were the landing runway (which it definitely was not this very gusty day!). Despite our obvious satisfaction, Ray Chatman like an embarrassed fond

mother, pointed out that we had easy means of determining our built-in overshoot at the outer marker and could have set up a corrected bearing for the final approach. Our reply was something to the effect that we were not the kind to demand "egg in our beer"! (Thruout the flight we were impressed by the fact that the "round figure" mileages on the IFR enroute charts were insufficiently accurate so that topographical chart measurements were necessary to match the capabilities of Radan. Approach plates, of course, were a natural.)

The basic package, shown at right, currently offered to the civil market consists of the Radan Drift Angle and Ground Speed equipment. Present weight is about 89 pounds and the price about \$20,000. It is expected that

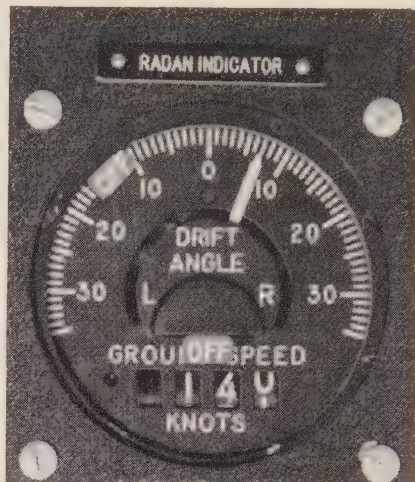


the distance computer-indicator, shown above, will add about 20 pounds and \$5,000. The component parts of this additional piece of equipment are to be consolidated into a three-and-one-quarter-inch dial-type production version.

Earlier and current military versions have figured in such outstanding uses as the intercontinental and transcontinental record jet flights of recent date, as well as the famous B-29 "hurricane hunter" programs. Nevertheless GPL stresses that this Radan, their PC-221A,

was designed throughout as a civil system suitable for any aircraft of Lockheed 18/Douglas DC-3 size on up. The A-R-T unit requires a vertical space in the underside of belly or wing of 12"x22"x24".

Since, with the exception of the actual castings and the magnetron, all



component parts are common "off-the-shelf" units, maintenance anywhere in the world is no greater a problem than with other electronic equipment.

Ray Chatman advises that they are planning their equipment to accept other input data, such as Glide Path information. In fact, a visual presentation equivalent to the new low-frequency system plotters is well within the capabilities of the Radan system and can be added if desired.

For the business pilots going into the high-altitude pressurized equipment of today and tomorrow, the advantages of instant Ground Speed information opens the door to Jet Stream flying techniques already developed by the military and until now virtually reserved for them. For that matter, so many obvious advantages abound, such as seeking the best cruise altitude while still in climb configuration, that any professional pilot can have himself a ball figuring out additional ones. It would be redundant to stress the advantages in long over-water flights or in undeveloped areas where many working aircraft must go. The Frequency Tracker is a standard 1-ATR rack size. To sum up, any concern as to which way the future of "Common System" aids may turn is relevantly unimportant to the "emancipated" Doppler-navigating pilot.

†††

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Proposed establishment of airports were accepted by the AirSpace Subcommittee in Los Angeles, at Williams and Peoria, Ariz.; Sacramento, Calif., (Army Field). The Los Banos, Calif., Fan Marker will be discontinued soon and removed from charts. The Fresno, Calif., L/MF radio range is to be realigned this spring with a proposed redesignation of Fresno Control Zone. Sacramento L/MF radio range is to be realigned and Amber Civil Airway #1 changed.

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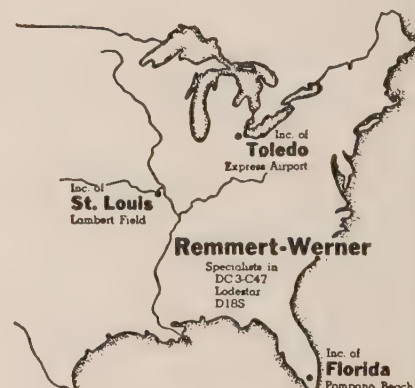
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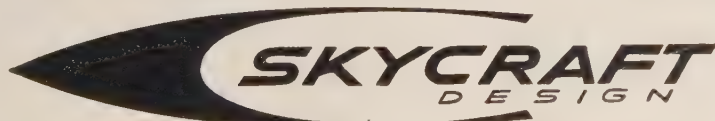


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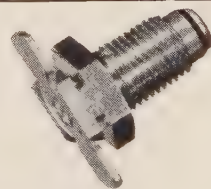
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(Continued from page 45)

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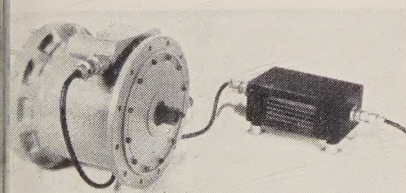
Seat Model 544 is designed to CAA SO-C39 Type 1 specifications and also complies with A.R.B. specifications No. of July 10, 1953.

Covered with muslin, the seat weighs 75 pounds including inertia reel and base. It has foam rubber back and seat cushions. The seat provides just under six inches vertical adjustment with fore and aft travel. Folding foam-rubber cushioned arm rests are adjustable. They include ash trays at the pilot's front end.



## New Drive For Aircraft Alternator Installations By Lycoming Division

A new mechanical constant output speed drive, more efficient, smaller and lighter than any comparable unit in existence is a development of Lycoming Division, Avco Manufacturing Corp. The drive is designed to maintain 400 cycle A-C generator speed constant in



aircraft installations regardless of variation in input speed or electrical load. The initial unit is 20 KVA size. Although developed initially for airborne uses, the unit will have applications in the marine, automotive and industrial fields.

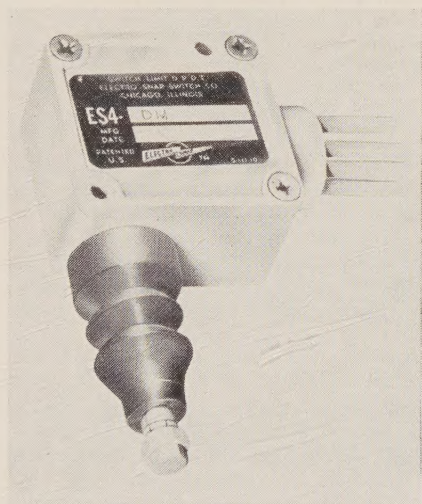
The new drive eliminates the requirement for a large number of precision parts through a simple mechanical approach giving more reliable operation,

simple maintenance and lower production cost. High ambient temperature operation is possible with initial units capable of intermittent 365-degree ambient operation and a growth potential for 500-degree ambients and higher.

## DPDT One-Way Action Switch

An Electro-Snap die-cast switch provides simultaneous, one-way action on two poles. Exclusive one-way action results in an electrical impulse on the inward stroke and does not operate the switch on the return to its normal position. The snap-action of the four-circuit switch mechanism is totally independent of the speed of the plunger movement.

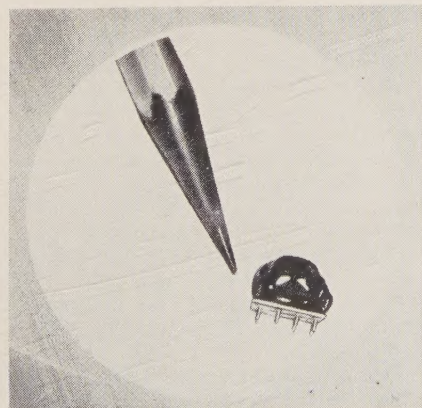
The DPDT basic switch is housed in an aluminum die-cast case with a splash-proof neoprene boot to protect its switching mechanism. It is designed to eliminate complicated one way dogs, extra switches and costly relays. The simultaneous break of two poles permits great flexibility in wiring variations.



## Circuit Plug-In Transformer

Celco Constantine Engineering Laboratories Co., is producing high precision plug-in transformers for the latest printed circuit application.

In keeping with today's avionic

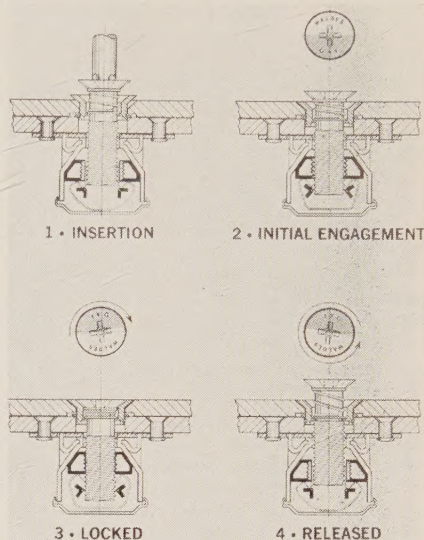


equipment where space and weight conditions are a dominant factor, these epoxy encapsulated units are designed for maximum moisture resistance and insulated for high operating temperatures. Plug-in terminals are spaced on multiples of .1-inch for standard grids.

## Quick-Action Panel Fastener

Waldes QAF quick-action stressed panel fastener is intended for use on structural load-carrying panels in aircraft, guided missiles and other applications where quick access to service areas is required.

The fastener will withstand high



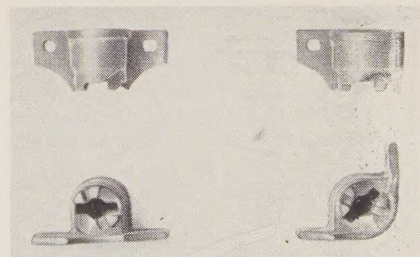
shear and tensile loads and may be locked positively in less than one-half torque-free turn. The device compensates automatically for sheet separation resulting from warpage or deformation in the panels being secured.

According to Waldes engineers, it conforms to the airframe industry's so-called "idiot-proof" operating requirements.

## Receptacles For Side, Corner Mounts

Two receptacles for side and corner mounting of quick operating fasteners to meet automation requirements are now being produced by Camloc Fastener Corp.

The two mounting holes have relaxed mounting tolerance to permit a low-cost



production operation. Rivet holes on which receptacles are to be mounted can be pre-punched by automatic means.

Designed for applications with light loads, the receptacles are die cast of aluminum alloy and are anodized according to Military Specification MIL-A-8625.

## Mooney Mark 20

(Continued from page 13)

The fuel capacity of the Mooney Mark 20 is 50 gallons in two 17½ gallon wing tanks and one 15 gallon reserve tank. This nifty arrangement permits better range (900 miles) or additional payload (90 pounds).

We wrung out the Mark 20 with air work and then attempted an ADF approach. The Mark 20 hugged the heading and flew the full approach smoothly.

We shot three landings.

Trying to level off the Mark 20 at one-half the height of a Boeing Strato-cruiser might have been disastrous in any other aircraft but the goof-proof Mark 20. I reasoned that our over-the-fence speed was 65 mph or about one-half that of a Stratocruiser therefore slicing the level off height by two should be the sure way to a grease job.

We came off the step and lost air-speed. At low speeds the laminar flow wing surfaces would not allow mushing or wallowing.

When the airspeed finally walked away, we hit, fairly oomph, my friends would say. Rationalizing in its purest form, I can only say that this technique was used to test the landing gear strength.

On the second landing I was able, by sheer stupidity, to simulate the first, with all four passengers oomphing noticeably.

"Don't worry," Norm confided. "It takes about six landings to get the hang of it. But once you've pinned it down, there's no pain and no strain."

"Thanks," said I, disconsolately.

The third time approached his point in a bouncy sort of way.

But the three landings were proofs to the fourth equation that the Mooney Mark 20 can take a whale of a beating on landings without a permanent set and it is as safe for beginners—the experienced—and the inept.

We taxied in and cut the engine. Norm checked the tanks. We had used less than eight gallons per hour!

Al Mooney sure rang the bell when he took the Mark 20 blueprint off the design board.

He has a light twin coming out next year which Norm Hoffman and Dick Martin beat the drums about as if the background music were John Phillip Sousa leading, "When The Saints Come Marching Home!"

If it can cut the mustard as neatly as the Mark 20, it might well blast away at the light-twin market and fly off with a lion's share of the corporate dollar!

### SPECIFICATIONS

#### Type

Four place, all-metal fuselage. Wing and empennage of pressure bonded, laminated aircraft spruce, treated and sealed for the life of the airplane. Fully-retractable tricycle landing gear. Steerable nose wheel.

#### Engine

Lycoming Rate 150 h.p. at 2700 rpm.  
Performance (Maximum Gross Weight)  
Maximum Cruising Speed

4,900 feet, 75% power, 2450 rpm, and 23.7" hg. 165 mph

#### Economy Cruising Speed

10,000 feet, 55% power,  
2350 rpm and 18.5" hg. 150 mph

Range of Optimum Cruise (4,900 feet)  
750 miles 4.6 hrs.

Range at Economy Cruise (10,000 feet)  
900 miles 6.0 hours

Top Speed (Sea Level) 171 mph

Rate of Climb (Sea Level) over 900 fpm

Service Ceiling 17,200 ft

Absolute Ceiling over 20,000 ft

Landing Speed 57 mph

#### Weights

Gross Weight 2,450 pounds

Empty Weight 1,415 pounds

Useful Load 1,035 pounds

Baggage Max. 120 pounds

Fuel (50 U.S. gallons) 300 pounds

Oil (2 U.S. gallons) 15 pounds

List price \$13,750



## Light vs. Heavy Twins

(Continued from page 11)

walk around, rest room facilities, galley facilities and a passenger area large enough to permit the installation of tables to accommodate maps and papers so that business could be carried on with associates during the flight.

On the question of whether or not the top management of his company insisted upon a two-man crew, we were informed that they certainly did, especially if any weather were to be flown.

All of the multi-category group with whom we discussed the utilization of light twins were in agreement that light twins served a definite need in their organizations, but that their use was confined to limited ranges and mostly to middle management, engineers, salesmen and others who had more frequent occasion to visit isolated field points and to go into the smaller off-airways airports. This type of business airplane use constitutes a major portion of flying in some of these companies. In practically all of them, however, light twins seemed to be restricted to VFR with permission to top clouds when there was at least a 1,000 foot ceiling. Night flying seemed also to be the rule.

Some of the operators who use single engines and light twins exclusively and do not operate heavier twins, said they saw no reason why a properly equipped light twin could not be flown in weather. One of these operators pointed out that while icing conditions were extremely hazardous they had had no difficulty in getting assignment to altitudes where icing conditions did not exist. A few of these exclusive light twin operators seemed to believe that the proficiency of the pilot should be the determining factor in permitting all-weather operations. None of them denied that duplicate radio and instrumentation were essential to safe weather operations and most of them insisted that they have them. A few admitted that they could use a few more frequencies than they had aboard.

One of these exclusive light twin operators seemed anxious to establish the

point that not all companies were fully sold on aviation and that in starting flying service for his company, it was impossible to sell management on the purchase of a heavier twin with full airline type equipment. He believed that the amount the company was willing to invest in aircraft and the amount they were willing to spend in operating aircraft was the guiding factor. This particular chief pilot insisted that most of the big companies having large fleets and many heavier aircraft had originally started just as his company had: with one airplane. He believed that the history of most of these large operators would show that the fleet grew in numbers and in quality as management became sold on the value of company-owned and operated aircraft. He insisted that his company was on the way to expanding its operations which he felt sure would eventually involve heavier aircraft with more complete equipment.

Our survey on light twins versus heavier twins brought to light this universal opinion: business needs more than one type of airplane; the light twin is the only truly post World War II modern aircraft and many operators prefer them to most of the 1930 drawing board type of heavier twins available. Everybody seemed in agreement that aircraft manufacturers were several years late in bringing out heavier twin aircraft with modern aerodynamics, increased range and speed, tricycle gear and pressurization.

When confronted with the proposition that the production of such airplanes with the inevitable higher costs in labor, materials, engines, accessories and such, would involve capital outlays from five to ten times higher than pre-war cast-offs, they still thought that there is a market for them. We heard many regrets expressed that Cessna had decided not to produce its pressurized 620. Many business aviation people with whom we talked seemed to believe that the 620, which would have sold for less than \$500,000 completely fitted, would have had a good market in replacing airplanes of the Twin-Beech and Lodestar category. No one disagreed with the idea that faster and more modern powered aircraft than the 620 are also needed in business.

It was the consensus that the light twin market had only been tapped and that the potential need for light twins in the next five years would appear to be far greater than the need which has developed in the last five years.

If the cross-section of men with whom we talked and who are charged with the responsibilities of selecting, equipping and operating the business fleets of America are right in their opinions, light twins are here to stay, the years to come will see their numbers greatly increased, and the next year or so will see most of them operated under policies to insure excellent safety records.

Anyway, as the old Indian said, "it's a good thing everyone doesn't think alike or everyone would want my squaw!"





#### TYPE 21A ADF WEIGHS ONLY 19.7 POUNDS

##### Component Unit Weights:

Receiver, 6.8 lbs.; Loop, 4.3 lbs.; Loop Housing, 0.5 lbs.;  
Indicator, 1.3 lbs.; Control Unit, 1.6 lbs.; Power Unit, 5.2 lbs.;  
CAA Certificate No. 1R4-9 U.S. Military: AN/ARN-59  
British Certificate of Approval VC-78

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### The Time Tested ADF Now in Less Weight, Less Space

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Now pilots enjoy the advantages of dual installations of this compact miniaturized equipment in tolerable weight and space requirements.

The ARC Type 21A ADF is built to today's more critical speed and environmental demands. It has hermetic sealing of vital components, such as the entire loop assembly. It covers all frequencies from 190 kc to 1750 kc . . . operates on only 2.8 amps at 27.5 volts dc input or equal power at 13.5 volts. A significant feature is the extremely low loop drag—only two inches outside the aircraft skin.

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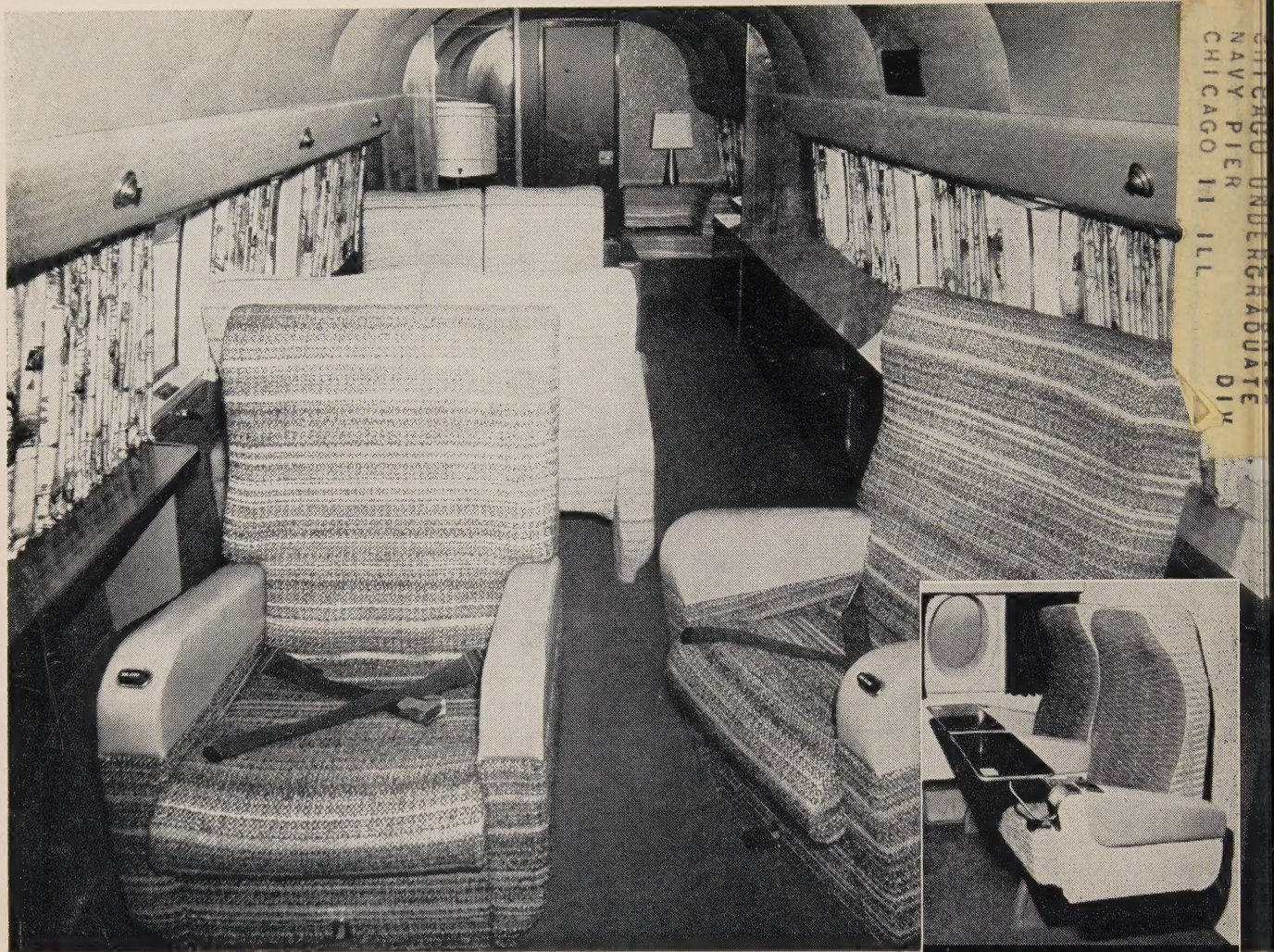
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For any type of aircraft AEROSMITH seats' built-in quality and exclusive features effect lower maintenance costs, longer life, and valuable weight savings that mean greater payload. Customized design, individual tailoring, painstaking manufacturing give you the exact aircraft seat to meet your needs and yet meet both C.A.A. TSO C25a and TSO C39. They can be supplied in low, medium or high density, with recline from dress-up to berthable configuration. Your choice, too, of a wide range of upholstery fabrics and coverings. Aeromsmith special design allows a roomy storage space underneath.

Major American airlines feature Aeromsmith seats as well as many business and military aircraft and foreign air carriers.

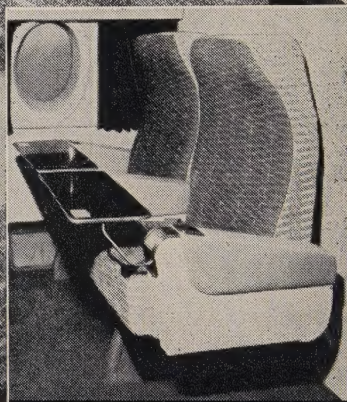


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